

ANGLIA RUSKIN UNIVERSITY

*PULSE PROJECT: AN INVESTIGATION ACROSS BODIES,
CULTURES AND TECHNOLOGY*

MICHELLE LEWIS-KING

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ANGLIA RUSKIN UNIVERSITY

ABSTRACT

FACULTY OF ARTS, LAW AND SOCIAL SCIENCES

DOCTOR OF PHILOSOPHY

PULSE PROJECT: AN INVESTIGATION ACROSS BODIES, CULTURES AND TECHNOLOGY

MICHELLE LEWIS-KING

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This thesis introduces *Pulse Project* (2011-2016), a creative research series exploring an ecology of complex relations between art, humanities, medicine, and technology. In this series, I embody transdisciplinary research practice through my performing as an instrument or medium between others and myself, and between cultural traditions for understanding and mediating the body. Drawing upon my expertise as a clinical acupuncturist with training in biomedicine, I use Chinese medicine and music theories to inform my algorithmic soundscape compositions. These soundscapes are not sonifications of modern Euro-American principles of circulation or embodiment but offer another perspective to conceive of/listen to the interior spaces of the body-in-being.

In this transdisciplinary study, practice-based research is used to give form to the transdisciplinary research process by producing performances, personalised sound works, graphic notations and interpersonal correspondences that interweave artistic, medical and technological ways knowing together into new material configurations. This project also questions the distinctions between premodern and modern, East and West and self and other.

To investigate these distinctions, *Pulse Project* interrogates the aesthetic and philosophical axioms underpinning modern and contemporary art, medicine and technology through using premodern Chinese medicine and music theories in tandem with cutting edge technology. Thus, this research travels laterally between cultures, practices and epochs and calls for a radical change in conceiving of the body in 'oriental' and 'occidental' terms in order to both reduce ethnocentrism and also to travel beyond the tired bifurcations between mind and body, self and others and Western and othered cultures. In combining art, technology and diverse medicines together with contemporary digital culture, this project opens transverse lines of inquiry that create new interconnections between disciplinary practices, whilst at the same time, it generates new forms of cultural engagement through performance and sound works.

Keywords:

Practice-Based Research, Transdisciplinary Research, Art, Science and Technology Studies, Chinese Medicine, Sound Studies.

Contents

i	Acknowledgements
ii	Abstract
vii	Copyright
1	Preface
2	* Notes on Navigating this Thesis
3	Introduction
3	Summary of Overall Project
5	Context for Research Questions
7	Research Aims and Objectives
9	Research Questions
12	Dissemination and Contributions
13	Research Approach and Methodologies
14	Ethical Considerations
15	1. Research Approach and Methodologies
16	Preface
16	Interdisciplinary, Multidisciplinary and Transdisciplinary Research
20	Methodology: Arts-Based and Practice-Based Research - An Entangled Field
23	Evaluation of Research Outcomes
29	2. <i>Pulse Project</i>: Key Theoretical Contexts
30	Preface
30	Art, Science and Technology (AST)
34	Feminist Science and Technology Studies
35	* Feminist Critique of Objectivity and the View from Nowhere
39	The Intersectional Body
45	The Clinic, <i>Gestell</i> and Performative Practice
45	* The Technological Frame of the Clinic
47	* Practice, Performance and the Clinic
51	3. <i>Pulse Project</i>: The Chinese Medicine Encounter
52	Preface

52	The Hegemony of the Clinic
52	* Definitions
54	* Clinical Experiences
55	* Debates
58	<i>Pulse Project</i> and Cross-Cultural Discourse
60	The Body-Politic of the Medical Gaze
64	On Clinical Auscultation and Diagnostics
67	Intercultural and Interpersonal Encounters with Medicine
68	* The Clinical Encounter: A Case Study
69	The Body Ecologic
76	<i>Zhèng</i> as Matrixial Interface
77	The Clinical Encounter as Sculpting Processes: <i>Zhèng</i> , <i>Shén</i> and <i>Yì</i>
80	The Sculpting of Infrasound (<i>Qì</i>)
83	4. <i>Pulse Project</i>: Practice-Based Works
84	Preface
84	Pulse Project (2011 – 2016)
85	Situating <i>Pulse Project</i>
87	The Pulse Reading Process
88	* The Chinese Pulse Diagnosis Procedure
91	The Notation Process
95	The Composing Process
96	An Introduction to Chinese Medicine and Music Theories
99	Soundscape Composition as a Healing Modality
102	Pulse Project: Instrumentation Processes
104	<i>Pulse Project</i> as Rhythmanalysis
106	The Peer Review Process
108	Participant Engagement and Feedback
108	* Feedback Methodology
109	* Results
110	* Some Key Responses
113	Collaborations
120	5. Art, Medicine, Society, Sound
121	Preface
122	Part One
123	Relational, Transversal and Ethico-Aesthetics

123	* Relational Aesthetics
125	* Transversal Relations and Ethico-Aesthetics
127	Pulse Project and Sound Studies
129	* Sound and the Affective Social Economy
136	Part Two
137	Biomusic, Aural Architecture and <i>Pulse Project</i>
137	* Listening to the Body: Biomusic
150	* Listening to Listening: Aural Architectures
151	Art, Science and Public Engagement
156	Chinese Medicine as Art
159	6. Conclusion
160	Preface
160	Findings and Implications
160	* Art, Medicine and Technology
165	* <i>Pulse Project</i> Performances and Intermediality
166	* Practice Based Methodology
168	* Sound Studies
169	Limitations
170	Further Research
171	Conclusion: <i>Pulse Project</i> and <i>Rhythmanalysis</i>

I. References

174	Books, Videos, Catalogues, Journals, Online Sources, Miscellaneous
193	Images

II. Appendices

196	Appendix I Glossary
202	Appendix II Publications
253	Appendix III Research Outputs
257	Appendix IV Exhibitions
268	Appendix V Ethics Proposal
273	Appendix VI Participant Information Sheets
278	Appendix VII Participant Questionnaire
280	Appendix VIII Participant Feedback Log
290	Appendix IX <i>Pulse Project</i> Notations
306	Appendix X SuperCollider Code Example

308	Appendix XI SuperCollider Compositions
323	Appendix XII Ryoko Akama's PULSE Score
329	Appendix XIII Collaboration Emails

III. Accompanying Material: Digital Audio Files*

343	List of <i>Pulse Project</i> Soundscapes
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* This section refers to the audio files submitted in accompaniment with this thesis.

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Pulse Project Performance at the V&A (2013) [performance view]. Sackler Centre, Victoria and Albert Museum. © Michelle Lewis-King. Photo: Nick Fudge.

Preface

This thesis presents *Pulse Project*, a transdisciplinary and practice-based research (PBR)¹ project conducted at various public locations between the years 2011 – 2016. As such, the production of practice-based works forms the fundamental basis for making contributions towards transdisciplinary research, particularly the cross-disciplinary field of art, science and technology studies (AST).² This project's research objectives and questions originate from my experience of practising as an artist-acupuncturist within the context of the (British) biomedical clinic. Viewed syncretically, these practices can be characterised as transdisciplinary and intercultural by their very nature, since working with the body as an artist-acupuncturist within context of the biomedical clinic integrates together three disciplines (art, medicine and technology) and two cultural approaches to medicine (biomedicine and Chinese medicine). Given this experience, I have come to view the Chinese medicine clinical encounter as a unique time-space that contains multi-dimensional interactions between one person and another and one cultural practice (modern allopathic medicine) within another (traditional Chinese medicine). Chinese medicine (CM)³ itself is a practice that draws from over a thousand years of artistic, scientific and technological innovations and clinical solutions. Accordingly, the CM clinic provides a multidimensional space where practitioners can adopt a wide range of differing (and often contradictory) approaches to engaging with the body via clinical interventions and treatment strategies. It is precisely this transdisciplinary and intercultural lifeworld⁴ experience of the CM clinic that this project addresses by adopting the CM clinical encounter itself as a central artistic research tool.

CM is a holistic medicine that has developed an ecological approach to internal medicine by investigating the nature of the body as it exists in relation to its environment and to the cosmological unfolding of the world. This holistic approach to knowledge production that is applied within the CM clinic is accordingly adopted as a central approach to research in this project. By reconfiguring the unique characteristics of the CM clinical encounter into a performance research tool, I am able to holistically conduct research that interconnects multiple disciplinary research strands together into new, unique and multidimensional forms of knowledge production.

¹ Refer to the Glossary in Appendix I for a definition of practice-based research.

² Refer to the Glossary in Appendix I for a descriptions and contextualisation of Art, Science and

² Refer to the Glossary in Appendix I for a descriptions and contextualisation of Art, Science and Technology Studies.

³ Please see the Glossary in Appendix I for a description and contextualisation of this term.

⁴ Please refer to the Glossary in Appendix I for a definition and brief discussion of this term.

Notes on Navigating this Thesis

Titles for artworks and all non-English terms, especially Chinese terms, will be notated in italics. With regards to using Chinese concepts and terminology in this thesis, firstly, although the specific category of Asian medicine discussed in this thesis is popularly referred to as 'Traditional Chinese Medicine' (TCM), TCM is representative of a 'modernised' Chinese medicine that was established from the 1950's onwards (see Hsu, 2008, pp.465-485). Without going into depth about the political and educational issues that surround 'modernised' TCM texts and their translations, in this thesis I use the term 'Chinese medicine' (CM) to indicate and be inclusive of the wider range of texts and translations that exist outside the remit of TCM.⁵ Secondly, CM terms are combined together with English terms, such as 'Liver Qi' (instead of 'Gān qì'). This particular combination of CM terms and English terms within this thesis reflect the 'house style' of post-Maoist English educational textbook translations of CM texts where the translators felt that 'combining English and Chinese terminology,' would 'provide a more readable style' (Maciocia, 1989, p. xiv). Lastly, Chinese authors' names are presented with their surname placed before their first names in keeping with how Chinese authors are referred to in China.

Regarding the format of this thesis, instead of having a 'List of Figures' that the reader has to refer at the back of the thesis, each image and image caption is instead posited within the body of the thesis text to facilitate easier reading. This method of directly identifying images and content also allows me to differentiate the intellectual property of each artist. Image captions are formatted as follows: 'Figure' followed by: (image) number, (image) title, date, image details, copyright attribution, author, image source (if appropriate). For example, 'Figure 1: *Pulse Project Performance* (2011-2016). © Michelle Lewis-King. Photo: Léna Lewis-King.' Furthermore, unless I provide a footnote stating otherwise, all italicised words within quotations are the original author's emphasis.

Finally, this thesis includes my own published excerpts on this project, which are located in Appendix II.⁶ To properly identify and cite all published excerpts in this thesis, whenever I cite my own published material, I use footnotes to identify the location of the source text in the appendix by identifying the page number each excerpt corresponds to.

⁵ For further discussion on this, see Scheid, 2002, pp.3-4 and Hsu, 2008, pp.465-485.

⁶ For example, my abstract, which is rewritten for this thesis, has been published in several versions for different journals. See Appendix II, pp. 204, 220, 231, 241.

Introduction

Summary of Overall Project

Pulse Project (2011- 2016)⁷ is a socially engaged performance research series exploring the relational interfaces between the body, medicine, culture⁸ and technology. Given that CM⁹ is a medical tradition/technology that has travelled across time and space to become practiced 'in 160 countries' (Graham, 2012, n.p.) and has lasted for over a thousand years (see Unschuld, 1999, p.354), this project draws upon the considerable knowledge production of CM as a research medium because it offers a holistic model of the body that contrasts with the predominant allopathic model of the body. These performances use the Chinese medicine encounter as a strategic tool to investigate new synergies between art, medicine, technology, East, West, modern and pre-modern. At the same time, *Pulse Project* performances also explore the complexity of intercultural communication¹⁰ and transdisciplinary knowledge production.

The main creative outputs of the performances comprise bespoke graphic notations, digital soundscapes, live sound performances, participant-researcher communications and collaborative projects. The soundscapes and graphic notations themselves are informed by CM pulse analysis, which uses human touch as a medical technology. For example, each participant's pulse is interpreted by utilising the perceptive intelligence of touch to analyse people's pulse emissions as a set of unique sound wave 'images'¹¹ that indicate particular (clinically significant) meanings about an individual's bodily processes. There are more than twenty-eight CM pulse wave-images, with each wave-image corresponding to specific somatic states of being. *Pulse Project* soundscapes are also

⁷ The title 'Pulse Project' will be used throughout this thesis to refer to all of the creative outputs of this project that constitute its method for knowledge contribution. These creative outputs are: 1) performances, 2) graphic notations, 3) research participants' discussions and feedback correspondences, 4) creative collaborations and 5) soundscape compositions and digital performances of the soundscapes (which comprise preprogrammed multichannel sound installations, live sound synthesis performances and works composed for headphones).

⁸ I use this term not as a universal concept, but as a 'micro-macro' concept. Refer to the Glossary in Appendix I for a definition of this term within a 'micro-macro' context.

⁹ Further discussion of CM concepts, practices and politics is provided in Chapter Three.

¹⁰ Please refer to the Glossary in Appendix I for a definition of this term.

¹¹ Image essentially means type. Pulse wave sensations all correspond to twenty-eight pulse wave sensation 'types.' This is discussed in detail in the section titled: 'The Pulse Reading Process' in Chapter Four. For further discussion on 'pulse images' see Hsu, 1999, p.164 and Flaws, 1995.

composed in accordance with traditional Chinese music theory. By using Chinese medical and music theory to inform the research outputs, this study offers alchemical¹² and process-based methods for understanding the body.

Consequently, the notations and soundscapes are not interpretative of the Western notion of the circulatory system, but instead, draw on early CM philosophy in order to represent a person as a living cosmos – as a body-consciousness pulsating with matter and energy.¹³ Each soundscape reflects both a rhythmic commonality and distinctness, i.e., the rhythms of the heart, essences and energies that share a commonality with all living resonant beings - yet, each participant embodies their life in a unique way and emits their own unique musical signature through the pulse.

Since human touch has the capacity to blur the distinctions between oneself with another, by using touch as a methodology, this study generates notations and soundscapes that are able to convey a unique ecology of infrasonic resonances hidden within and between human *beings*.¹⁴ Consequently, this study explores touch as a human technology that challenges and extends current approaches to what technology is and does. Moreover, touch is investigated throughout this study as a human technology that articulates materializations of the body and embodied process that contrasts with representations produced by solely using digital technology – which deploys mechanical, logical and mathematical systems in order to operate.¹⁵

Lastly, *Pulse Project* explores contemporary art, science and technology (AST)¹⁶ studies from an intercultural perspective. In using my creative practice together with my scholarship of two forms of medicine (biomedicine and Chinese medicine), this practice-based project offers unique comparisons of expertise and approaches between disciplines, histories and cultural practices from the position of extending expertise from

¹² By alchemical, I refer to the causality of bodily process according to Chinese medicine, which functions somewhat like an elemental landscape. For example, the center of the body, the stomach, is characterized as the element 'earth' or as a field – the workings of which function somewhat like a compost heap that is prone to exterior climatory conditions such as coldness, summer heat, and dampness. These elemental processes and climates of the body work according to alchemical process. For example, warmth within the body is produced as a result of the processes of the 'fire' organs (the heart and triple burner), these heating processes are controlled or 'cooled' by processes of the 'water' organs (the kidney and bladder). The body's internal organs also have an interior-exterior relationship with the external climate, as mentioned above in the case of the stomach. These elemental and alchemical processes are described in greater detail throughout chapters three and four. See also Unschuld, 2003, pp.124-144 for further reading.

¹³ This paragraph is a rewritten excerpt from one of my previously published my articles. See Appendix II, p. 204.

¹⁴ This is to emphasize the ontological investigative nature of this project.

¹⁵ This paragraph is a rewritten excerpt from one of my previously published articles. See Appendix II, pp. 204-205.

¹⁶ Further discussion of the field of AST in relation to the aims and objectives of this project can be found on pages 30-33.

within all of these fields. At the same time, this research also seeks to break with the ethnocentric limitations of the coherences of 'occidental' (the Western self) and 'oriental' (the West's 'other') by creating a new dialogic imaginary that exists *between* these cultural categories.

Context for Research Questions

As a fine artist who undertook medical training and the establishment of a clinical practice,¹⁷ I was required to be subject to certain constraints and responsibilities that scientists are subject to, such as the rigors of studying biology, anatomy, physiology, pathophysiology, differential diagnosis and evidence-based medicine... of obeying strict clinical protocols and ethical codes and to prioritize the care of others as a profound charge. Yet, at the same time, I studied bodily process from the metaphysical approach of CM where the body is an assembled cosmological landscape shaped and altered by continuous alchemical and ecological processes.¹⁸

The CM clinic can be thought of as highly performative – from the reflective activities of pulse reading, taking case histories and discussing bodily process according to ancient texts – to the dynamic activities of palpating the surfaces of the skin, inserting and twisting needles and burning Moxa¹⁹ over acupuncture points. These CM interventions integrate intuitive, aesthetic, alchemical, medical, philosophical, poetic and technical forms of knowledge into an integrated set of health promoting strategies. This integration of the poetic and the scientific often applied in CM clinical practice is strikingly absent in the biomedical clinic. Experiencing this contrast in approach to what science is and does within both CM and biomedicine practices caused me to reflect upon the role creativity plays - or doesn't play - within medical encounter and within the interpersonal dynamics of healing itself. Practicing as an acupuncturist in a British biomedical clinic also gave me direct experience of the way biomedicine is firmly considered or valued as a 'science' whilst CM is not, a situation that compelled me to reflect upon why this might be so.²⁰

¹⁷ After graduating with an MA in Fine Art from Chelsea College of Arts UAL in 1995 and exhibiting my work as a sound artist (with an interest in alchemical process) in London for seven years, I began studying Chinese medicine full-time at the University of Westminster in 2002 and completed my studies in 2005 with a BSc (Honours) degree - after which I began my own clinical practice. This history is referred to again on page 22.

¹⁸ This paragraph is quoted from one of my previously published articles. See Appendix II, pp. 225-226.

¹⁹ See Footnote 205, which refers to this substance and its practice in clinic.

²⁰ This viewpoint can be further evidenced by: Hartmann (2006, n.p.) 'An attack on Chinese medicine' and Marié (2011, pp.5-13) 'The Transmission and Practice of Chinese Medicine.' This

It must be pointed out that CM practitioners must obtain sufficient knowledge of core biomedical concepts and practices and be able to work with GPs and other healthcare practitioners to maintain patient health and safety.²¹ Nonetheless, the experience of practicing CM techniques within the context of the biomedical clinic enabled me to regard the body from an alternate viewpoint to the biomedical map of the body. By offering creative strategies for interacting with and intervening into the emergent spaces of the body, CM allowed me to think poetically about the embodied processes of others – to conceive of medicine as a performance art.

Since there are two forms of medicine at work in the CM clinic – traditional Chinese and modern allopathic medicines - it stands to reason that they represent two approaches to the body. Simply stated, the key differences are that, according to Chinese philosophy and medicine, the body is a metaphysical entity... a temporal micro-cosmos of continuously transforming inter-relational substances - an organism of immanent²² emergence. Whereas the biomedical model of the body, largely influenced by Cartesian and Augustinian traditions, views the body as a set of mechanical parts to be 'fixed' when they malfunction.²³ These approaches to the body continue to inform and shape philosophical and medical investigations within Chinese and Euro-American cultures respectively.²⁴ Therefore, the body as research site is examined throughout this thesis by inquiring into the complexity of the body itself - by inquiring not just 'what' a body is²⁵ but 'how' a body is - from intercultural and transdisciplinary perspectives.

point is also the focus of discussion in the section 'The Hegemony of the Clinic' in Chapter Three.

²¹ Training in acupuncture in the UK equips students with biomedical knowledge sufficient to allow working within the NHS and also in consultation with GPs and other healthcare teams as part of its accreditation process (see BAAB, n.d., n.p. and University of Westminster, 2016, n.p. – click on the 'Career's' tab for student testimonials of their post-graduate work placements in medical clinics). This training enables UK acupuncturists to work with other healthcare professionals, particularly with patients' GPs to assist in bringing patients off certain medications, understanding key lab test values (blood and urine) and their clinical significances, to identify 'red flags' (the signs and symptomatology of life-threatening conditions) and to know when refer patients back to their GP's.

²² See the Glossary in Appendix I for the definition of this term.

²³ See Kwok, 2004, p.249 and Almog, 2005, p.85 for a discussion on this theme.

²⁴ This aim to create an intercultural dialogic is echoed by the writings of artist-researcher Ho King Tong. In his chapter 'Transfer and Translation: Negotiating Conflicting Worldviews' from Engels-Schwarzpaul's and Peters's (2013) *Other Thoughts: Non-Traditional Ways to the Doctorate*, Ho writes: 'While philosophical worldviews may not be debatable, knowledge is... and this debate may require supervisors [Westerners] to relocate themselves to a space-in-between culture' (Ho, 2013, p.92). Ho argues this is important because the 'differences in cultural outlook instigate tensions between China... and the still dominant West' (2013, p.93) and that these intercultural tensions form a vital part of 'the process of reshaping global political structure' (2013, p.93). This aim to expand (Western) research engagement towards a more intercultural - and therefore less dominant - form of communication is also one of the central concerns of this research.

²⁵ This question is related to Deleuze's famous question, 'What Can a Body Do?' - a question that recalls Baruch de Spinoza's statement that: 'We do not even know what a body is capable of.' See Deleuze, 1992, p.226.

Research Aims and Objectives

One of the main aims of this thesis is to formulate a project that addresses the set of problems that have emerged from real-world experience of practicing as an artist-acupuncturist within a biomedical context. The lifeworld²⁶ of the CM clinic constitutes a situation of complex interactions between body-based problems²⁷ on the one hand, and finding solutions in the form of treatment strategies on the other. Attending to body-based problems in CM is accomplished by using a specific set of interventions and performance methods that use the human body itself as the central medical technology. This project therefore mirrors the lifeworld situation of the CM clinic and uses practice-based research to investigate research problems by adopting the CM encounter as a tool of transdisciplinary investigation. To this end, *Pulse Project* adopts the clinical encounter as a practice-based tool to make explicit how transdisciplinary research can – by using artistic practice to investigate medical, technological and cultural approaches to the body – produce new multimodal forms of knowledge. *Pulse Project's* transdisciplinary research (TR)²⁸ reveals:

- New integrations of knowledge of the body across artistic, medical and technical discourses (AST).²⁹
- New forms of intercultural communication through developing dialogue between Chinese and Euro-American knowledge traditions.
- New forms of social awareness and social meaning-making by co-producing knowledge with research participants.

Consequently, this project aims to examine the lifeworld problems of CM clinic

²⁶ Refer to the Glossary for the definition of this term.

²⁷ In CM, all body-based problems are not separated from a person's consciousness and emotions, and consequently, these aspects of being are an integral part of the medical investigation and treatment process.

²⁸ Social science scholar Patricia Leavy defines transdisciplinary research (TR) as real-world 'problem-centered research' (Leavy, 2012, p.14). TR investigates problems by conducting research that involves 'collaboration between two or more disciplines with high levels of integration causing the development of new conceptual, theoretical and methodological frameworks' (Leavy, 2012, p.33). As TR is an approach that is central to this project, discussion on this topic occupies a chapter in its own right. See Chapter One: 'Research Approach and Methodologies.'

²⁹ This aim aligns with those of Roy Ascott's Planetary Collegium. For example, Roy Ascott defines the aims of his Planetary Collegium to be the development of 'new knowledge in the context of the arts, through transdisciplinary inquiry and critical discourse, with special reference to *technoetic* research and to advances in science and technology. Its seeks to reflect the social, technological and spiritual aspirations of an emerging planetary society, while sustaining a critical awareness of the retrograde forces and fields that inhibit social and cultural development.' See Ascott, n.d., n.p. For a definition of Technoetic, please see the Glossary. Additionally, as this project aligns itself with the research currently being conducted at Ascott's Planetary Collegium, this association is discussed further in Footnote 98.

mentioned in the 'Context for Research' section by re-performing aspects of the CM clinic and thereby transforming it into performance research zone where experimental and intuitive supposition can be explored and tested. To accomplish this, *Pulse Project's* CM performances are situated in social settings³⁰ to challenge current social understanding of art, medicine and technology practices and thereby enable the co-creation of new understanding of these practices as an integral part of the research process.

Each performance encounter, as the enactment of practice-based research (PBR), involves engaging research participants in the creation of 'relationscapes' (Manning, 2009). By using relational touch to trace and notate participant's unique pulse rhythms, by including our inter-personal communications about art, science and technology and by composing or playing soundscapes from participants' pulses, these transdisciplinary practice-based methods both draw upon and evidence the co-emergence and co-production of relational meaning that takes place between researcher and research participant within the performances.

Manning's (2009) discussion on Napangardi Robinson's work *Mina Mina* (2005) is particularly relevant to further illuminate upon the manner in which I use PBR in this project. *Pulse Project's* PBR seeks to create audio-visual expressions of the emergent and multidimensional life forces that exist within and between living bodies. Manning describes this 'relationscape' process at work in *Mina Mina* and writes:

'This movement-across... is a vibrating movement, a resonance that forces itself upon our vision, transforming it into a politics of touch. This is a politics of touch because what the painting compels is not a static viewing but an activity of reaching-toward that alters the relation between body and painting, creating a moving world that becomes a touching of the not-yet touchable. This touching is rhythmic... These [lines and points]... takes me... right where I can become, to a force-field that is an eventness in the making, an exfoliation of experience.' (Manning, 2009, p.153)

In affirming the presence of the participants of this research through using touch and engaging participants in experimental and poetic discussion regarding a medicine that differs from orthodox medicine, *Pulse Project* performances aim to raise consciousness by allowing participants to experiment, discover and renegotiate their understanding of how medicine might work given a different set of circumstances.

In *Pulse Project's* CM clinic, participants' clinical 'notes' are repurposed into graphic notations and medical prescriptions are reorganised into music compositions. Thus, a larger more symphonic representation of the clinical encounter becomes possible. Pulse reading becomes a meeting place of multi-dimensional, infrasonic, electromagnetic, and

³⁰ Social settings have included: street corners (in Oakland, California during cultural events), universities (during conferences and exhibitions), the V&A Museum's Sackler Centre, art galleries and Industrial buildings (such as E.ON – Electriciteitsfabriek in Den Haag, Nederland).

biological resonances. These resonances are materialised in the form of drawings, notations, compositions and soundscapes of the body's meridians and acupuncture points pulsating... they illuminate upon the hidden, emergent and natural power of the relational body in time-space.

Research Questions

'The requirement that a research study should set out with well-defined questions, topics, or problems is often at odds with the actual course of events in artistic research.' (Borgdorff, 2012, p.164)

Henk Borgdorff, Professor of Research in the Arts, has written extensively on how artistic research differs from mainstream research culture through calling attention to the unique manner in which artistic research is not 'hypothesis-led,' but 'discovery-led' (Borgdorff, 2012, p.80). Borgdorff argues that artistic research draws on building knowledge through adopting intuitive and trial-and-error methods and that artists engage with a research topic directly (often physically) – a position that goes against the grain of academic objectivity (see Borgdorff, 2012, p.80). Macleod and Holdridge (2005) also argue that according to their research of fine art doctorates, artists 'materially realise their ideas' (2005, p.7) rather than theoretically. Theory is often a 'stepping stone' (2005, p.6) for constructing concrete knowledge, rather than the central basis for producing knowledge. Moreover, key research concepts are developed *a posteriori* to practice-led inquiry (see Macleod and Holdridge, 2005, p.7). These statements have significance for this project because I investigate the relationships between art, science and technology by first using PBR as a physiological or embodied processual method that can materialise new thinking processes both within and between disciplines - rather than focus on the purely conceptual and linguistic forms of research creation.

Researchers Elo and Luoto (2014) argue that it is precisely the complexity of artistic research that qualifies it as the most appropriate medium to 'reconsider the very conditions of experience, starting from the notions of time, space, place, and the body' (2014, p.8).³¹ Furthermore, Elo and Luoto comment that our reality is increasingly

³¹ In exception to Elo and Luoto's (2014) assertions for artistic research's unique ability to investigate the complex interconnecting layers of self, technology and lifeworld, it is important to also identify feminist ethnography as another research approach that has, since at least 1995, addressed similar concerns to those undertaken by artistic research (and this project), e.g. has created methodologies that produce new understanding of lived experience and the emergent relationality between oneself and the world. Although feminist ethnography does not fall into an easily definable set of methodological practices (see Schrock, 2013, n.p.) it can be characterized as productive of methodologies that generate knowledge of 'another's life world by using the self...

mediated by a technology that exceeds our ability to contain it, and that the 'fundamental questions [that] arise are irreducible to the technological means-ends schema' (2014, p.7) of traditional academia 'and even scientific objectivity as such' (2014, p.8). To extend the functionality and reach of conventional academic research, Elo and Luoto therefore suggest that the practice-based methodologies deployed by arts and philosophy researchers are uniquely able to transform how research questions are formulated and investigated because they use practice to both embody and reflect upon the complex processes of technological mediation of the world (see Elo and Luoto, 2014, pp.7-9).

Given these findings mentioned above addressing how arts-based practices are transforming research conduct (including research question formulation), and add these findings to fact that the development of research questions for this project has occurred in a cyclical fashion³² - by having occurred *during* (rather than prior to) the research process - the formulation of research questions in this section therefore reflects the complex cyclical relationship between the desire to know via creative methodical investigation and the production of new thinking through material processes.

Consequently, adopting a more conventional (Mode 1)³³ research approach, i.e., posing a singular research question and answering that question as the main approach to producing knowledge, is not appropriate for realising the aims of this project. This is particularly so because *Pulse Project* uses artistic research to widen the scope of the science-centric research processes to include performative, intuitive and process-based approaches to knowledge production. My research questions are not asking objective questions (*what*) but are asking processual questions (*how*) - which involve practice. *Pulse Project* seeks to create knowledge about the body in relation to technology and

as an 'instrument of knowing' (Ortner, 1995, p.178), or as 'documenting lived experience as it is impacted by gender, race, class, sexuality, and other aspects of participants' lives' (Craven and Davis, 2013, p.1). Following on from the development of 'New Materialism' by theorists such as Barad, Braidotti, Deleuze and Guattari, Manning and Massumi, more recent strands of feminist ethnography seek to examine the complex dynamics of material relations between 'the teeming interfaces of "us" and the "world"' (Tiainen, Kontturi and Hongisto, 2015, p.14). This new 'materialist' direction in feminist ethnography has particular resonance with the way PBR is used in this project to materialise knowledge of the imperceptible interconnections between the embodied self and the lifeworld.

³² For example, the initial concerns this project were to develop new methods that bring artistic and scientific investigation of the body together in unique and unexpected ways through using PBR. These concerns are first explored through the experimental enactment of clinical behaviours within the performances (to see what might happen). The feedback from participants and the processes of producing artworks and conducting conversations within the performance situation then generates both new areas of discovery and issues that require further clarification. These outcomes generate a spiralling production of question and answer research formulation. In this way, artistic practice creates a more complex development of research than the linear hypothesis-results model of conventional 'Mode 1' research (see the Glossary in Appendix I for a definition of this term).

³³ See the Glossary in Appendix I for a definition of this term.

culture³⁴ by asking a set of questions that are lifeworld problem-centred (they arise from clinical experience),³⁵ are able to produce knowledge from within practice-based discourse and are also able to produce knowledge across disciplines (transdisciplinary). Therefore, the research question in *Pulse Project* should be not singular, but plural, multi-faceted, cyclical and inter-relating³⁶ to reflect the complexity of the aims of this TR project. The questions below reflect my holistic approach to research. At the same time, these questions also address the lifeworld problems that provide the impetus for this project.

1) How and what is a body?

I research this question from an intercultural and medical perspective, as both Chinese medicine and biomedicine practices have complex histories that impact upon contemporary approaches to the body and embodied process.³⁷

This question is the *central* research question and is therefore explored throughout this thesis. The other questions below are extended parts of this main question.

2) How does *Pulse Project's* reworking of the relationships between the body, art, science and technology practices contribute new knowledge to AST practice (transdisciplinary research)?

This question is fully explored in chapters one, two and the Conclusion.

3a) What new understanding of contemporary practices (contemporaneity) might be discovered and created by researching premodern medicine (CM) in relation to current practices of art, science and technology? Anne Scott's question is very relevant to ask in this context:

'Rather than asking how alternative therapies can 'work' within a modernist ontology... we should turn the question around. If... alternative therapies *do* 'work' within clinical practice, what are the implications for our metaphysics?' (Scott, 1998, p.21)

3b) Following on from this question of a different metaphysics, Salter (2010) asks: could the use of premodernist practices (such as CM) offer 'the possibility of a world without cuts between living phenomena and matter'? (2010, p.xxxi). What might this integrated world 'without cuts' contribute to current understanding of the human - lifeworld relationship?

These questions are explored throughout chapters two, three, four, five and the

³⁴ The overall concern of researching the relationship between the body, technology and culture to produce new knowledge is reflected in the title of this thesis. Also see the Glossary in Appendix I for a discussion on the term 'culture.'

³⁵ See Leavy, 2012, p.14.

³⁶ This approach to formulating research questions is also appropriate for the complexity of the transdisciplinary research process. This is discussed further on pages 27-29 in Chapter One.

³⁷ See Marié, 2011, pp.5-13 for discussion of the global migrations of both biomedicine and Chinese medicine and how these migrations have produced new indigenous medicines, hybrid practices and political tensions.

Conclusion.

4) How does situating *Pulse Project's* participatory performances and multichannel installations within a social context³⁸ create new knowledge? How does the participatory aspect of this project enunciate new co-produced knowledge?

These questions are addressed in Chapter Four, in the section titled 'Participant Engagement and Feedback,' throughout Chapter Five and in the 'Sound Studies' subsection within the Conclusion.

Dissemination and Contributions

Pulse Project has produced contributions in the form of research 'outputs.' These outputs are briefly summarised³⁹ in this section to highlight the more significant contributions of this project.

This research has been published in the following academic journals: *Digital Creativity* (Taylor and Francis), *ELSE Journal for Artistic Research* (Transart Institute Berlin), the *Journal of Sonic Studies* (University of Leiden Press), *Reflections on Process in Sound* (London College of Communication, UAL) and *The Acupuncturist* (a British Acupuncture Council publication).⁴⁰

A summary of significant exhibitions of *Pulse Project* are: *Circadian - 4DSOUND at TodaysArt NL 2015* Den Haag, *INFOCRASH 48* in association with Ars Electronica, Linz, *PROJECT ANYWHERE 2015*,⁴¹ *Drawing Towards Sound*, University of Greenwich (which included artists such as Pierre Boulez, John Cage, Cornelius Cardew and Aura Satz), *Show, But Also Tell* at the Anatomy Museum, Kings College London, *Hardcore Software*

³⁸ The social context for this project comprises street festivals, educational spaces in museums, galleries and universities as well as festival venues in repurposed industrial buildings across the UK and Europe where I have directly engaged with a diverse public between the ages of 18 to 75. These venues gave me access to audiences from different countries and diverse backgrounds, which enabled this research to have a wider reach than if it were staged purely in an art gallery or museum context. The 'social' aspect of this project also enabled me to directly connect with research participants – making me accountable to each participant. I informed them what the performance would entail and asked participants for feedback as an integral part of the research process. This study excluded children (under 16) and those over 80 on ethical grounds – see Appendix V for details on conditions for ethical approval of this project. See also Appendix VI to view the 'Participant Information Sheets,' Appendix VII to view the 'Participant Questionnaire' and Appendix VIII to view the 'Participant Feedback Log.'

³⁹ A 'Research Outputs' document containing a full list of *Pulse Project's* creative outputs can be found in Appendix III.

⁴⁰ See Appendix II to refer to the publications produced as a result of this research project.

⁴¹ This is an online global platform for disseminating artistic research. Each year, *Project Anywhere*, a global peer-review panel and online exhibition platform select five projects to sponsor for an entire year. *Pulse Project* was one of the five selected for 2015. See: Project Anywhere, 2015, n.p.

at the White Building, London, *Disjointed: Digital Culture* at the Ex-Teresa Museum, Mexico City, *Artists' Games* at Spike Island, Bristol and *Digital Futures* at the V&A Museum, London.⁴² I have also exhibited this research as a solo show titled: *Pulse Project* at *The Gallery*, M Art Space, Shanghai, China.⁴³

The most significant collaboration to come out of this research is with Paul Ooman, composer and director of 4DSOUND - Institute of Spatial Sound, the 4D creative team and the art producers *TodaysArt*.⁴⁴ This collaboration resulted in the commission of a new interface⁴⁵ for performing *Pulse Project* soundscapes (which I produced and performed at the international digital art festival *TodaysArt NL2015*). I have also worked with scientists and technologists at *The Port*, CERN, Geneva in 2014 and with artist-composer Ryoko Akama and Koto player Sumie Kent on *PULSE* at the University of Huddersfield in 2013.

Methods used to disseminate my research are:⁴⁶

- Write a blog on my research.⁴⁷
- Present my research at conferences.
- Give public talks and workshops.
- Publish articles.
- Discuss my research via radio broadcasts.
- Publish my soundscapes online.⁴⁸
- Professional publication of sound-works: a digital EP of my soundscapes titled: *Pulse Landscapes* was released via the music label *Clang* in 2013.⁴⁹
- Organise collaborative events that explore this research.
- Exhibit this research at galleries, perform at festivals and produce multi-channel sound installations.

Research Approach and Methodologies

⁴² See Appendix IV for images of exhibitions.

⁴³ Again, see Appendix IV, pages 259-260 for images from this exhibition.

⁴⁴ This collaboration is discussed in detail in 'Biomusic, Aural Architecture and *Pulse Project*' in Chapter Five.

⁴⁵ See Chapter Five in 'Biomusic, Aural Architecture and *Pulse Project*' for a description of this project.

⁴⁶ For the full list of these outputs, please see 'Research Outputs' in Appendix III and 'Images' in Appendix IV. To hear the soundscapes and digital EP, refer to the digital files submitted with this thesis as described in the 'Enclosed Materials' list in section III (located at the back of the thesis).

⁴⁷ See Lewis-King, 2011-2016a, n.p.

⁴⁸ See Lewis-King, 2011-2016b, n.p.

⁴⁹ See Lewis-King, 2012, n.p.

This project undertakes a transdisciplinary approach to knowledge production through using artistic practice-based methods to investigate the complex of research questions identified in the previous section. Given that transdisciplinary and practice-based research are still emerging practices (see Leavy, 2012, p.53; Barrett and Bolt, 2007, p.3), *Pulse Project's* approach to research requires a more rigorous contextualisation and evaluation than can be provided in this Introduction. Therefore, Chapter One provides a comprehensive discussion of *Pulse Project's* approach to research.

Ethical Considerations

Because this project involves working with human subjects, ethical consideration of how the research methods and outcomes might negatively affect participants as well as any risks conducting this research in public places posed for participants and myself had to be rigorously undertaken before commencing this project. Consequently, I drafted a 'Research Ethics Proposal'⁵⁰ and applied for permission from the Anglia Ruskin University Ethics Committee to carry out the performances.⁵¹ The ethics proposal delineated the purpose and outcomes of my project. I also created a Participant Information Sheet⁵² as part of my proposal that outlines the study's interactive procedures and provides a detailed explanation of what participation in the study would involve.⁵³ During the performances themselves, I asked that all participants read the entire sheet so that they could give me their informed consent and confirm they understood the exact nature of their participation in the study before taking part. To further evaluate the ethical conduct of this project, all participants were also invited to evaluate or give feedback on my delivery of *Pulse Project* performances via the Participant Information Sheet (where my contact email is supplied) and also via the 'Participant Questionnaire'⁵⁴ (which was sent out by email to all participants who supplied me with their contact details).

⁵⁰ See Appendix V to view the 'Research Ethics Proposal.'

⁵¹ The Anglia Ruskin University Ethics Committee approved the proposal in November 2011.

⁵² See Appendix VI to view the 'Participant Information Sheet.'

⁵³ The Research Ethics Proposal and Participant Information Sheets were also reviewed and approved by the Anglia Ruskin University Ethics Committee.

⁵⁴ See Appendix VII to view the 'Participant Questionnaire.'

1. Research Approach and Methodologies

Preface

This chapter elaborates on the transdisciplinary practice-based investigation this project undertakes. The discussion is divided into three sections. Section one defines and differentiates transdisciplinary research (TR) from interdisciplinary and multidisciplinary research. Section two provides commentary on why practice-based research (PBR)⁵⁵ offers the best methodological approach for investigating *Pulse Project's* transdisciplinary objectives. Section three evaluates how the PBR methods developed for this project respond to *Pulse Project's* research questions to produce new knowledge.

Interdisciplinary, Multidisciplinary and Transdisciplinary Research⁵⁶

Stock and Burton define the problem facing researchers working in inter-, multi-, and transdisciplinary research sectors in the following passage:

'Without the benefit of disciplinary-style gatekeepers, there are no "right" or "wrong" definitions of multi-, inter-, and transdisciplinarity. As a consequence, however, a variety of different meanings have been attributed to the terms, some in concurrence, but others conflicting. Terms are either used interchangeably or the term that implies the greatest integration (transdisciplinarity) is simply taken as a default with little consideration for what it actually means in terms of the level of integration required.' (Stock and Burton, 2011, p.1094)

To establish my own research as transdisciplinary, in this section I examine the work of Patricia Leavy, a leading social science research scholar and editor of *The Oxford Handbook of Qualitative Research* (2014) to provide the most recent and reliable descriptions of inter-, multi-, and transdisciplinary research. In *Essentials of Transdisciplinary Research: Using Problem Centered Methodologies* (Leavy, 2012) and *Method Meets Art: Arts-Based Research Practice* - First and Second Editions (Leavy, 2009; Leavy, 2015), Leavy carries out a comprehensive survey⁵⁷ of existing scholarly

⁵⁵ According to research literature, ABR and PBR are somewhat interchangeable terms/practices. This is discussed in part two of this section.

⁵⁶ I must point out that my project differs from the multidisciplinary, interdisciplinary and transdisciplinary research described in this section in one respect. Rather than researching collaboratively with others across disciplines (as the majority of the literature reviewed in this section refers to), this project instead builds knowledge from my own direct personal (subjective) research across art, medicine and technology disciplines.

⁵⁷ Some sources for Leavy's literature review are listed as follows: Austin, W., Park, C. and Goble, E., 2008. From Interdisciplinary to Transdisciplinary Research: A Case Study. *Qualitative Health Research*, 18(4), pp. 557-564; Flinterman, J.F., Teclemariam-Mesbah, R., Broerse, J.E.W. and Bunders, J.F.G., 2001. Transdisciplinarity: the new challenge for biomedical research. *Bulletin of Science, Technology & Society*, 21, pp.253-266; Giri, A.K., 2002. The Calling of a Creative Transdisciplinarity, *Futures*, 34, pp. 103-115. Greckhamer, T., Cilesiz, S., Hayes, S.B. and Koro-Ljungberg, M., 2008. Demystifying interdisciplinary qualitative research. *Qualitative Inquiry*, 14(2),

research of multi-, inter- and transdisciplinary research by discussing current consensus regarding these practices.

According to Leavy's review of current models of multidisciplinary research (MR), she defines MR as involving a network of specialist representatives from several disciplines who maintain the research objectives, questions, methods, paradigms and codes of practice that are common to each researcher's respective discipline (see Leavy, 2012, p.16). In MR, researchers do not share a common research problem or framework and the working relationship is 'associative' (Leavy, 2012, p.20) because each specialist answers the research aims and objectives purely from within their own disciplinary perspective. Therefore knowledge production in MR occurs through researchers 'co-existing' (Stock and Burton, 2011, p.1095) within the research process by adding their own findings to, or linking their knowledge with, the findings of the other researchers of the team. This approach functions somewhat like conducting a survey on a particular topic, which offers a broad range of responses to a given question. Consequently, when it comes to developing aims and outcomes of MR research, whilst researchers may discuss or share their concerns and perspectives amongst each other, the disciplinary boundaries and research concerns of each researcher remains distinct and there is no 'synergy among outcomes' (Hirsch Hadorn, et al., 2008, p.24). For this reason, the MR process does not, as Leavy remarks, 'inspire the asking of radically different research questions' (Leavy, 2012, p.20) or outcomes.

In contrast to MR, Leavy defines interdisciplinary research (IR) as 'involv[ing] collaboration between researchers from two or more disciplines' (Leavy, 2012, p. 20) who co-produce research through adopting a common framework and methodological approach with which to investigate co-identified research problems (see Leavy, 2012, p.21). The focus on a common research question and outcome in IR allows for researchers across disciplines to interact more fully than in MR through the exchange of viewpoints and methodological approaches. However, Leavy (2012) identifies that academic consensus diverges on IR's significances and outcomes. For example, some researchers affirm that IR performs a juxtaposed and 'parallel analysis' of the research question (see Masini, 2000, p.120) – a process that essentially maintains the autonomy and boundaries of each discipline and generates a range of parallel findings that are then

pp.307-331; Hirsch Hadorn, G., Hoffmann-Riem, H., Bieber-Klemm, S., Ggrossenbacher, W., Joye, D., Pohl, C., Wiesmann, U. and Zemp, E., eds. *Handbook of Transdisciplinary Research*. Heidelberg: Springer. pp.19-39; Hesse-Biber, S. and Leavy, P., 2004. *Approaches to Qualitative Research: A Reader on Theory and Practice*. Oxford: Oxford University Press; Pohl, C. and Hirsch Hadorn, G., 2007. *Principles for designing transdisciplinary research*. Translated from German by A.B. Zimmermann. Munich: Oekom Gesell F. Oekolog; Somerville, M.A. and Rapport, D.J., eds. *Transdisciplinarity: ReCreating Integrated Knowledge*. Oxford: EOLSS Publisher Ltd. pp. 11-124.

compiled together to produce an overall outcome⁵⁸ (see Leavy, 2012, p.20). Conversely, other researchers⁵⁹ assert that IR investigations often involve mutual interaction and exchange due to researchers sharing a common research question as this allows them a common ground for discussing diverging codes of practice. These interactions also enable researchers to question the presumptions of their own disciplinary codes and practices – a process that results in a reduction of disciplinary bias and an increase of knowledge transfer across disciplines.

Ultimately, Leavy (2012) asserts that when compared with transdisciplinary research (TR) – where the main criterion is full integration of research aims, objectives and outcomes across disciplines – IR is not able to realise full integration of research literature, nor create inter-relating research methods and outcomes. Because the inter-relation of knowledge practices within TR creates reorganisation and re-contextualisation of disciplinary knowledge, Leavy concludes that ‘interdisciplinary collaborations presuppose disciplines and therefore do not challenge the disciplinary organisation of knowledge’ (Leavy, 2012, p.30). Subsequently, according to Leavy (2012), in comparison with MR and IR, TR genuinely produces a new approach to knowledge production.

TR transgresses disciplinary boundaries to develop a more interactive creation of knowledge. Leavy characterises TR as a ‘problem-centered approach to research that prioritizes the problem at the centre of research over discipline-specific concerns, theories or methods’ (Leavy, 2012, p.14) and further defines the working process of TR as: ‘collaboration between two or more disciplines with high levels of integration causing the development of new conceptual, theoretical and methodological frameworks’ (Leavy, 2012, p.33).⁶⁰ Here Leavy makes more explicit the difference between IR and TR. Although both IR and TR share a common research framework, TR itself is not defined by a discipline-specific question or aim, but by a holistic research focus that integrates (sometimes diverging) disciplinary questions together into a syncretic⁶¹ production of knowledge across disciplines.⁶²

⁵⁸ This research process is almost like MR’s associative knowledge building processes, except IR adopts a common research framework and MR does not – so the levels of research integration are clearly higher in IR.

⁵⁹ See Austin, Park and Goble, 2008, p.560; Pohl and Hirsch Hadorn, 2007, pp. 52-56 and Stock and Burton, 2011, pp. 1096-1097.

⁶⁰ Given that this project is problem centred (on issues arising from the clinic) and also integrates knowledge across disciplines into new knowledge, this commentary from Leavy succinctly describes the approach to knowledge creation this thesis undertakes.

⁶¹ The Oxford English Dictionary defines syncretism as: ‘The amalgamation or attempted amalgamation of different religions, cultures or schools of thought’ (Oxford Dictionary, 2016, n.p.).

⁶² This statement echoes my argument that TR requires not a singular research question, but multiple and inter-relating questions – as I argue in the ‘Research Questions’ section of the Introduction.

Although TR knowledge production yields results beyond any one discipline, this is not to say that TR should therefore be conducted from a neutral position. Regarding this point, Giri argues: 'Transdisciplinarity calls for an art of authentic embeddedness in one's discipline and ... does not mean cutting off from the ground where one stands but widening one's horizons' (Giri, 2002, p.108). Leavy further extends Giri's point that whilst TR works to integrate knowledge between disciplines – it does not need to completely jettison one's 'home' discipline by writing.⁶³

'While its true that some claim transdisciplinarity has the capability to make disciplines irrelevant... (I think researchers should be free to view transdisciplinarity in a different way), most scholars suggest, and I concur, that the firm grounding in one's 'home' discipline or disciplines is a vital asset in transdisciplinary research projects.' (Leavy, 2012, p.34)

In contrast to Giri's and Leavy's views, Hirsch Hadorn (2009) seeks to establish a standard 'unity of knowledge' (2009, p.ix) in TR that transcends using a 'home discipline' and argues for the creation of a common framework of investigation by using research questions and objectives as boundary objects.⁶⁴ Moreover, Hirsch Hadorn, Pohl and Scherlinger (2009) argue that it is crucial for TR researchers to develop a 'position of impartiality' (2009, p.24) – which is to say a position of 'objectivity.' In order to institute a standardised approach to TR, Hirsch Hadorn and Pohl (2008) have set out to create a series of model frameworks and terms that define best practice in TR.⁶⁵

Klein (2007) and Cronin (2008) identify the impartial and consensus type approaches to TR practice advanced by Hirsch Hadorn and colleagues (2008) as 'transcendent' because the focus of knowledge production is concerned with creating 'new knowledge *beyond* [outside of] the [relational] interactions among current knowledge bases' (Cronin, 2008, p.7). Whilst it is understandable that adopting a 'Mode 2'⁶⁶ approach to TR (as Hirsch Hadorn and colleagues define it) may better facilitate knowledge transfer across science, technology and humanities communities, such an approach presents problems for conducting TR within an arts context where research culture engages in producing subjective, practice-based, individualistic and unique forms of knowledge. To give an example of why impartial and transcendent approaches to TR may not be useful in the case of artistic research, Borgdorff writes that transdisciplinary research of disciplines such as: 'performance practice... [and] specific movement repertoires, often cannot be,

⁶³ I discuss Leavy's point on not needing to conduct TR from a 'neutral' position because this project uses artistic practice-based methodologies within a TR context to provide an alternative to object-oriented (objective) research production.

⁶⁴ Hirsch Hadorn, Pohl and Scherlinger (2009) define a boundary object as 'a common material or abstract object to which the different disciplines within a project refer to' (2009, p.7).

⁶⁵ See 'Core Terms in Transdisciplinary Research,' Hirsch Hadorn and Pohl, 2008, pp.427-432.

⁶⁶ See the Glossary for a brief description of 'Mode 2' research, which contextualises 'Mode 2' research in relation to 'Mode 1' research.

and does not wish to be, understood as research that transcends disciplines' (Borgdorff, 2012, p.92), since their interests lie in producing knowledge of 'the unsolicited and the unexpected' (2012, p.93).

Thus *Pulse Project* positions itself in alignment with Borgdorff's (2012) and Leavy's (2012) views of transdisciplinary knowledge production. That is to say, *Pulse Project* is grounded within the 'home discipline' of artistic practice, which is utilised as a research methodology for examining and informing modern auscultation (medical) practice and thereby widening this practice. At the same time, artistic research is used in this project to produce novel, indeterminate and unexpected understandings of the interplay between the body and society. Furthermore, by using artistic practice as a TR methodology, this project creates new ways in which knowledge practices (disciplines) might be syncretically mobilised into new cartographies of knowledge. This approach contrasts with the more traditional, singular and linear 'Mode 1' approach to knowledge production.⁶⁷

Pulse Project seeks to create knowledge from direct personal engagement with this study's research objectives. One example of this is how touch and participatory research are used together to develop new material inter-relationships between research participants, research questions and the researcher (myself). Consequently, *Pulse Project's* transdisciplinary analysis differs from how Hirsch Hadorn and colleagues (2008) define TR practice. Rather than developing knowledge from a transcendent and impartial position, knowledge is created in this project by using the relational, perceptive, time-based and immersive capacities of body. The body itself is used as a research site for producing artistic knowledge from the intercommunication between the body, society, knowledge fields and time-spaces (premodern, modern and contemporary).

Methodology: Arts-Based and Practice-Based Research - An Entangled Field

In this section I discuss the choice of and rationale for research methods adopted in this project. This task, however, is not entirely straightforward. After conducting an initial literature review, it quickly became clear that there were some inconsistencies in the way terms were used to define artistic research and arts-based methodologies. For example, when researching 'art-as-research,' the term 'arts-based' research was used interchangeably with 'art-as-research,' 'artistic research' and 'practice-as-research.'⁶⁸ There are also further distinctions between practice-based and practice-led research

⁶⁷ Refer to the Glossary.

⁶⁸ For instance, in McNiff's (2013) *Art as Research*, there is considerable entanglement and interchangeability between the terms 'artistic research,' 'art-as-research' and 'arts-based research.' See Intellect, 2013, n.p. for an example.

(PLR)⁶⁹ being debated.⁷⁰ A further complication with regard to the aims of this transdisciplinary project is that ABR is defined differently and used differently by different communities, e.g., theatre, applied arts and healthcare research. Additionally, the application of ABR methods within education and the science research fields (particularly social science, psychology and evidence-based healthcare science fields)⁷¹ tend to focus on the *translation* of artistic knowledge that can be used to transfer knowledge across sectors as the main focus of the research. This type of ABR practice adopted by education and science fields matches more closely the aims of *practice-led* research.⁷² Moreover, it is important to acknowledge that by using participatory research as an integral aspect of conducting artistic practice research, this project shares greater commonality with social science research than with studio-based (artistic) research. This is particularly so because, like social science, *Pulse Project* uses artistic practice to investigate a set of research questions within social (ethnographic) contexts.⁷³

Given the interchangeability of ABR/PBR/PLR within research literature and add this conflation of terms to the complex transdisciplinary interconnections this project uses artistic practice and participatory research to produce, it becomes necessary to provide as clear an account as possible of how *Pulse Project* positions itself in relation to particular research methodology discourses. Therefore, the following paragraph opens with a brief definition of ABR before moving discussion on to how ABR methods are currently used to

⁶⁹ For example, in Rust Mottram and Till (2007), a specific definition of practice-led research in the arts is avoided in favor of explaining this research field to be: 'Research in which the professional and/or creative practices of art, design or architecture play an instrumental part in an inquiry' (Rust, Mottram and Till, 2007, p.11). This review also points out that 'practice-led' research is practiced across creative arts and performance practices – and that this type of research can utilise practice: 'FOR knowledge construction where research aims are subservient to practice aims, THROUGH practice, where the practice serves a research purpose, or INTO practice, such as observing the working processes of others' (Rust, Mottram and Till, 2007, p.11). Whereas the Creativity & Cognition Studios at the University of Technology (Sydney) defines practice research in 'Practice Based Research, a Guide' in the following manner: 'There are two types of practice related research: practice-based and practice-led: 1. If a creative artefact is the basis of the contribution to knowledge, the research is practice-based. 2. If the research leads primarily to new understandings about practice, it is practice-led.' (Candy, 2006, p.1)

⁷⁰ It is important to point out that there are ambiguities between practice-based and practice-led components in this project because this research focuses on producing artworks as the basis for contribution to knowledge; yet at the same time, because the artworks are process-based objects, reflections on their production can also lead to new processual understandings about practice. Consequently, there remains an unavoidable slippage between PBR and PLR in some instances in this thesis. However, to maintain clarity of methodological focus, since the overall intention of this project is to utilise the artworks produced during the research process as the source for knowledge contribution throughout this thesis, this research should therefore be considered as a *practice-based* transdisciplinary project.

⁷¹ See S. Clift, 2012, p.120 and Parsons and Boydell, 2012, p.170 for abstracts that are exemplary of this focus on practice-led *translation* of ABR.

⁷² See footnotes 69 and 70 to review to recent definitions of 'practice-led research.'

⁷³ The social and participatory aspects of this research are discussed further in the section 'Participant Engagement and Feedback' in Chapter Four.

bridge art and science fields (particularly social science, psychology and medical research fields) and how this particular use of ABR relates to and informs *Pulse Project*.

In *Method Meets Art* (2009), Leavy refers to ABR as a progressive 'expansion' of the 'qualitative paradigm' (Leavy, 2009, p.4) and argues that ABR enables researchers to shape and demonstrate unique forms of knowledge production from subjective, particular and ever-evolving 'real world' problems that standard qualitative and quantitative research paradigms inadequately address (see Leavy, 2009, pp.4-13). This viewpoint resonates with my experience in learning and applying research methodologies as a student of integrative medicine.⁷⁴ To give one example, I used my previous experience of working with sound (as an ABR) to inform the development of an evidence-based acupuncture study⁷⁵ – and it was this act of the translation of practice from one field (art) to another (medicine) that enabled me to consider healthcare problems from a different vantage. Thus, adopting artistic research to address body-based problems within a medical context generated a greater range of possibilities for positive therapeutic outcomes.

Conversely, in *Pulse Project*, my approach adopts a reverse logic to the ABR approach used in the healthcare research scenario described above. This is because *Pulse Project's* research methods draw on body-based learning gained from within a *medical* research context and translates this knowledge into an *artistic* research context. McNiff (2008), a leading scholar of ABR, further elaborates on the definition of ABR as:

'the systematic use of the artistic process... as a primary way of understanding and examining experience by both researchers and the people that they involve in their studies... these inquiries are distinguished from [ABR] research activities where the arts may play a significant role but are essentially used as data for investigations that take place within academic disciplines that utilize more traditional scientific, verbal, and mathematic descriptions and analyses of phenomena.' (2008, p.29)

This definition makes more explicit the critical positioning of this project. When I was an acupuncture student researcher (and later a researcher-clinician), I utilised artistic process as 'data' to inform the objectives and outcomes of qualitative research (ABR). Whereas for this project, I adopt artistic practice methods to examine the social experience of engaging with a transdisciplinary set of medical and technical practices⁷⁶ that unfold within the performance encounter.

⁷⁴ By this I am referring to my studies on the BSc (Honours) in Integrated Medicine: Acupuncture course at the University of Westminster, London between 2002-2005.

⁷⁵ In an unpublished acupuncture study conducted during my BSc course (see Lewis-King, 2005), I tested the effects of applying sound – via using a tuning fork at the frequency of 400 Hz - to a point on Kidney channel to see if there were any therapeutic effects during pulse analysis. The research aimed to determine whether the applied frequency evidenced any signs of positive influence on the Kidney meridian pulse.

⁷⁶ Such as staging a medical consultation, pulse analysis or case history notation.

Lastly, Barrett and Bolt (2007) argue for artistic practice-based research (PBR) to be considered as the production of knowledge in itself and call for its wider acceptance in academia by stating, 'Rather than attempting to contort aims, objectives and outcomes to satisfy criteria set for more established models of research' (Barrett and Bolt, 2007, p.3), PBR methodology can contribute to and innovate research because artistic practice *leads* the research process (see Barrett and Bolt, p.3). PBR methodology thus offers an alternative form of research that addresses 'the role of the experiential, problem-based learning and multiple intelligences' (Barrett and Bolt, 2007, p.2) that can, at the same time, incorporate indeterminate (rather than pre-determined) outcomes as part of the knowledge-producing process. This viewpoint is echoed by Leavy whose remarks below elaborate on the ways in which artistic research produces multimodal knowledge:

'the arts have the potential to reach a broad cross-section and to be both emotionally and politically evocative for diverse audiences... This is because the arts connect with people in sensory ways – reaching people on a level of humanness which extends far beyond the reach of the confines of any one discipline. Moreover, the arts can promote dialogue which cultivates ... critical consciousness... In these ways and others, [artistic] research practices can be used in community based research projects... as a means of sparking conversation and mutual learning. The capability of artistic forms to convey information to public audiences in understandable and resonant ways makes [artistic research] useful as a representational vehicle in many kinds of transdisciplinary projects, particularly when research results in multiple outcomes, as is generally the case.' (Leavy, 2012, p.106)

In alliance with Leavy's description above, which makes explicit the unique ways PBR produces knowledge across disciplines, *Pulse Project* likewise adopts PBR as the optimal approach for responding to the transdisciplinary aims of this project. Furthermore, *Pulse Project's* PBR methods also investigate and deliver unique insights regarding the social and time-based relationships between researcher and research participants.

Evaluation of Research Outcomes

Since *Pulse Project's* PBR outputs form the material premise upon which this thesis's research analysis and knowledge contribution is based, this section evaluates how *Pulse Project's* PBR methods⁷⁷ both answer the research questions identified in the Introduction⁷⁸ and also how they contribute to both practice-based and transdisciplinary

⁷⁷ See Chapter Four for detailed discussion on *Pulse Project's* creative research outputs – inclusive of participant feedback cycles and creative outputs.

⁷⁸ The main questions and aims this project explores are: i) How and what is a body? ii) How does *Pulse Project's* reconfiguration of art, medicine and technology contribute new knowledge to transdisciplinary research? iii) How might premodern Chinese medicine inform contemporary art,

research fields.

Overall, *Pulse Project's* PBR outputs produce knowledge through:

- Creating new social conversations (and therefore meaning-making) about cultural approaches to art, medicine and technology.
- Providing new researcher-participant communication and learning through performance, email correspondence and participant feedback forms.
- The production of new collaborative projects based upon this project.

Pulse Project's PBR generates 'art-as-research'⁷⁹ by producing research documents within the performance that double as artworks, e.g., case study notes become graphic notations. This artistic enactment of the research process within the performance is conducted to focus attention on the material plasticity of research creation itself – to literally make art from the research processes. This bidirectional process between the academic research process and PBR outputs, especially my conducting (medical) research processes as 'art',⁸⁰ demonstrates more explicitly the way artistic practice can be used to *perform* research knowledge production across disciplines.

Within the context of the performances, *Pulse Project* adopts a 'case-study'⁸¹ approach to conducting artistic research. This is because taking case histories is a key clinical methodology for gathering relevant data in relation to a patient's/client's medical question (problem). Subsequently, this project repurposes a science-based research method into an artistic investigation tool in order to generate new reflections on medical practice (and therefore new learning), which can then be fed back into healthcare practices. Moreover, this project's performances and soundscapes (as PBR outputs) produce greater awareness of the role creative listening plays within the medical encounter. This is evidenced in the way the clear distinctions between diagnostic approaches to listening, analysis and treatment and artistic approaches to listening, analysis and treatment are blurred within the performance encounter. Therefore using PBR methods to repurpose aspects of clinical practice potentially offers healthcare, social science and psychology researchers the opportunity to listen and relate to patients and participants in novel and less 'prescribed' ways.

science and technology practices? iv) How does performing/producing *Pulse Project's* PBR in a social context create new knowledge?

⁷⁹ This term is used here to emphasize how artistic practice can engage with, investigate and transform scientific research into a new research formation.

⁸⁰ By this I refer to performing pulse analyses, case study consultations and producing clinical notations – these are all research related processes within the professional context of clinical practice.

⁸¹ The Oxford Dictionary defines a case study as: 'A process or record of research into the development of a particular person, group, or situation over a period of time' (Oxford Dictionaries, 2016, n.p.).

This artistic research of clinical practice presents an opportunity for clinicians precisely because the imperative to get the diagnosis or the consultation ‘correct’ is temporarily suspended. This allows practitioners/researchers to use their creative skills, and at the same time, learn new methods for producing greater reflective listening and inter-personal interaction. Consequently, this project can raise awareness of patients and clients in training situations for healthcare and social science sector workers. This raised awareness created by listening creatively aids trainees and researcher-practitioners to gain a deeper sensitivity to the inner lives of others and thus build greater empathy and interpersonal rapport skills – skills known to have significant impact upon patient (and practitioner) wellbeing.⁸²

Therefore the PBR methods of:

- Re-enacting the clinic as a method for reflecting upon its practices.
- Listening deeply to peoples’ pulses to gather other forms of information existing beyond pathology identification.
- Reinterpreting diagnostic functions to discover unexpected forms of learning about the body.
- Turning clinical notes into musical scores rather than into purely medical data.
- Developing conversations between researcher and participants that are open to creative and indeterminate processes as a vital aspect of meaning-making within the clinical encounter.

All of these methods can be applied in clinical training and research sessions to promote and enhance creative communication skills between researcher-practitioners and participant-patients in healthcare, social science, psychology and education sectors.⁸³ This demonstrates how *Pulse Project*’s unique artistic knowledge production can be applied to and shared with other disciplines.

Since the lifeworld problems arising within the CM clinic inspired *Pulse Project* and the development of its research questions,⁸⁴ accordingly this project carries out an ethical and aesthetic investigation of the clinic because it uses artistic practice to develop unique PBR methods that enable an examination of the conduct of clinical investigations of the body.

⁸² For articles on the link between listening, building rapport and enhancement of patient health and wellbeing, see Bryan, Marrow and Appolonio, 2009, p. 281-291; Winefield and Chur-Hanson, 2001, p.90-94 and Hepworth, et al., 2009, p.44.

⁸³ I will return to this theme in the section ‘Art, Science and Public Engagement’ in Chapter Five when I discuss ‘Eidolon – the Technical Body,’ Beverly Hood’s on-going artistic research collaboration with doctors in training situations.

⁸⁴ See the sections: ‘Context for Research Questions’ in the Introduction and ‘The Hegemony of the Clinic’ in Chapter Three for further reading on the lifeworld problems that underpin this project.

For example, as mentioned above, in the performances I adapt case history⁸⁵ and pulse analysis methods into artistic methods to reflect upon the biomedical processes of the clinic. By listening intensely to others, engaging in participatory forms of research⁸⁶ and by exchanging knowledge regarding modern and premodern medical practices with others, *Pulse Project* produces fresh and socially responsible ways of engaging in interpersonal co-creative forms of meaning-making within the clinical encounter.

Pulse Project's adaptations of case-study consultations and clinical notes create a mirror of the clinical encounter so as to question it... to test it out in public... to open up imaginary and autonomous spaces within this encounter that can be discussed and rearranged through communication and creative production with others. The data gathered then reflects not only explicit clinical knowledge, e.g., a participant's resting heart rate, rather this approach (using PBR) also allows for the inclusion of the sensorium of consciousness to become an integral aspect of clinical knowledge production. *Pulse Project's* artistic research (PBR) outputs do not produce a diagnosis but produce artistic knowledge *about* the diagnostic process. Instead of recording medical signs and symptoms to analyze in relation to pathology, *Pulse Project's* analyses generate an aesthetic abstraction of the diagnostic process, creating a zone of intensive 'listening' to another person and capturing tacit knowledge⁸⁷ of their bodily processes. This process creates new methods for listening to the dynamics of clinical practice itself.⁸⁸

Furthermore, *Pulse Project* adopts PBR as a methodology for producing transdisciplinary materializations of knowledge. By using PBR to gather different sets of information that are relevant to both clinical and artistic research situations, each PBR output forms new interconnections and understanding *between* these practices. The hand-drawn graphic and clinical notation documents further demonstrate how PBR can produce transdisciplinary knowledge as they engage in several interrelating strands of inquiry simultaneously. For example, the notations are at once a diagnostic inscription⁸⁹ of participants' pulses, an aesthetic response to a participant's pulse, (the notations are infrasonic 'portraits' of participant's bodies) and a musical score used to translate the pulse analysis into a soundscape.

The soundscape compositions and multichannel performances (as PBR) are the

⁸⁵ In terms of ethics, I have made every effort to protect participants' identities and to prepare them for the performances by asking each participant to read the Participant Information Sheets before taking part. See Appendix VI.

⁸⁶ These include email correspondences, personal communication via feedback questionnaires and producing bespoke immersive soundscape experiences from participants' pulses.

⁸⁷ See the Glossary for a definition of this term.

⁸⁸ Again this combines ethics and aesthetics by using artistic practice to enhance clinical practice.

⁸⁹ Please refer to the Glossary for the definition of this term.

materialisations of syncretic transdisciplinary knowledge production because they create knowledge of the body by using a practice-based method (sound composition) to interweave medical knowledge (contained within the diagnostic process) together with technical knowledge (created through the production of new GUI interfaces⁹⁰). Additionally, the composition and interface development processes of each soundscape bring traditional Chinese music and medical theories into communication with contemporary (American-European) programming languages in order to create polyphony from cross-temporal, cross-cultural and intermedial⁹¹ layers of knowledge.

This approach uses TR and PBR to create what Roy Ascott coins as 'syncretic reality' (2005, p.1) – a transdisciplinary object that does not strive to produce research as a 'unity of knowledge' in the way Hirsch Hadorn (2009, p.ix) argues for, but rather a syncretic production of knowledge – as Ascott argues for here:

'In the syncretic context, extreme differences are upheld but aligned such that likeness is found amongst unlike things, the power of each element enriching the power of all others within the array of their differences. Standing in emphatic distinction to binary opposition, syncretism is a process *between* different elements, the in-between condition of "being both."' (Ascott, 2005, p.1)

Ascott's argument makes clear how *Pulse Project's* PBR methods can produce transdisciplinary knowledge by bringing various knowledge traditions and practices into communication - without abolishing their differences - to create multiple layers of knowledge production. This occurs through allowing differences to create the conditions for discovery of unexpected connections and articulations between approaches and practices.

Thus the creative outputs produced and analysed throughout this thesis develop syncretic layers of research that form a rolling cycle of 'question' and 'answer.'⁹² This research design facilitates knowledge through creating strands of research that loop backwards, forwards and transversely throughout the research process⁹³ (see Figure 1). For example, *Pulse Project's* PBR generates a series of socially situated investigations, interactions and feedback cycles that develop into a progressive knowledge production, i.e., the work is produced, reflected upon and improved as the practice is developed over

⁹⁰ There are at least two different GUI or 'graphic user interfaces' that have been developed in connection with this project – a MAX/MSP patch for PULSE (2013) and a Five Element Interface made specifically by Paul Ooman at 4DSOUND for Pulse Project. These interfaces and the ways in which they enhance the perception of embodiment are further discussed in chapters four and five, pages 114, 142-144.

⁹¹ The creation of 'intermedial' knowledge is discussed further in '*Pulse Project Performances and Intermediality*' in the Conclusion.

⁹² See Flinterman, et al., 2001, pp.259-260 and Leavy, 2012, p.59 for a discussion on transdisciplinary research and how it creates a spiraling and recursive form of knowledge production.

⁹³ This approach contrasts with the linear subject-object-analysis of Mode 1 research.

time. Additionally, the social relevance of *Pulse Project's* PBR process is tested out through cycles of performing in public, assessing participant data in questionnaires, reviewing and reflecting on participant and academic feedback – and then starting the whole process again – but from a new position that implements knowledge gained from each cycle into further advancements of practice-based and academic research processes within this thesis.

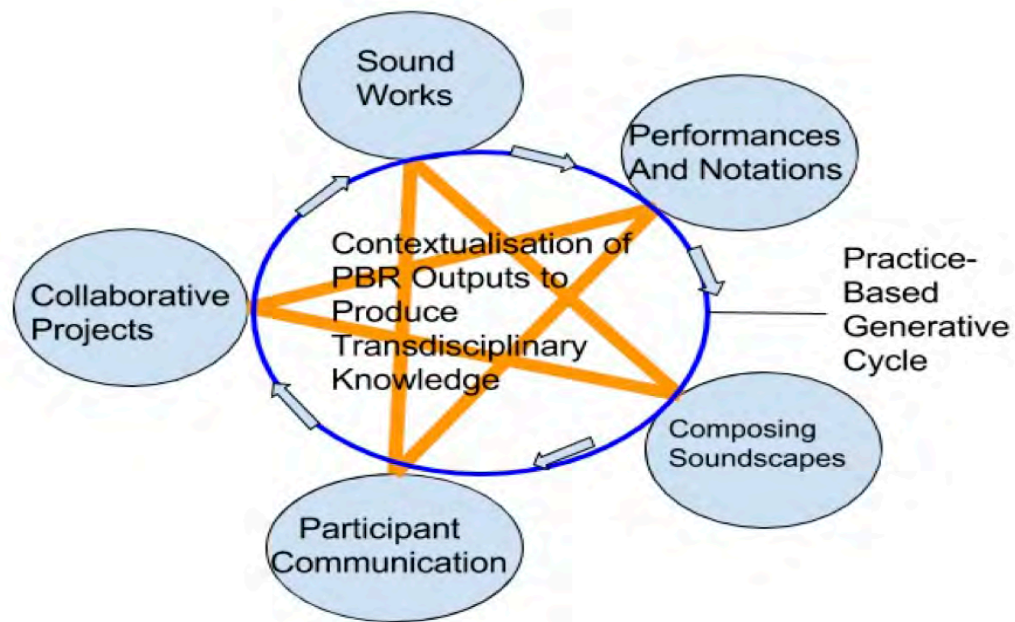


Figure 1: *Pulse Project Research Process* (2016) [digital diagram] © Michelle Lewis-King.

Thus the process of writing this thesis contextualises the spiralling cycles of PBR generated within the textual body of this thesis by:

- Collating layers of knowledge produced in practice, e.g., artistic, sonic, bioscientific, therapeutic, clinical, technological and body-centred research strands.
- Reviewing and analysing literature across art, medicine and technology disciplines (AST).
- Discussing and analysing the significances of PBR outputs in relation to reviewed literature to create new intercommunications between theory and practice.

Consequently, the process of developing *Pulse Project's* practice-based methods in tandem with their critical contextualisation within this thesis has engendered new and unique cartographies of transdisciplinary and intermedial knowledge within and across the fields of art, medicine and technology, practice-based research and sound studies.

2. *Pulse Project*: Key Theoretical Contexts

Preface

This chapter situates *Pulse Project* in relation to the theoretical discourses that inform its investigative aims and objectives.⁹⁴

Art, Science and Technology (AST)

In the interests of making my position in conducting this research as clear as possible from the outset, it is important to state that I am primarily a contemporary art scholar-practitioner who works across and between life sciences (medicine) and creative technology fields of practice. This thesis therefore presents a transdisciplinary project that is situated within a practice-based 'contemporary art' context.⁹⁵ *Pulse Project* seeks to demonstrate how performance and sound works, as practice-based methods, articulate unique interconnections between artistic, scientific and technological ways of knowing that, in turn, produce new practice-as-knowledge contributions to the emerging field of AST.⁹⁶ To determine how this project's creative works both draw from and contribute to AST, I first provide a brief account of this research area.

According to Roger Malina, Founder-Director of *Leonardo*,⁹⁷ definitions of AST practice have shifted many times over the last fifty years. Malina writes that when he first founded *Leonardo*, what we now regard as AST was originally called 'computer arts,' then it

⁹⁴ The theoretical domains of this chapter underpin the subsequent chapters of this thesis. For example, as I discuss key theoretical discourses that address relations between the body, the clinic and socio-environments, Chapter Three critically positions the body and clinic in relation to Chinese medicine discourse. Chapters Four and Five outline this project's investigation of the interplay between the body, the clinic and socio-environmental contexts through both practice-based outputs and this project's position in relation to the works of relevant peers.

⁹⁵ The contextualisation of 'contemporary art' practice for the purposes of this thesis is an important but tricky task. As an artist who engages with science and technology from within fine art context – my concerns and approaches are different from those engaging with this theme within 'art and science,' 'new media' and 'mainstream art' contexts. Jane Prophet, artist and Professor of Creative Media addresses the unique situation of working 'in-between' these categories (as this project does) in her 2011 article: 'New Media, Art-Science and Contemporary Art: Towards a Hybrid Discourse? An Artist in the Laboratory: Co-Operating (T)reasonably' by delineating these artistic practice concerns into three separate categories: new media art (NMA), mainstream contemporary art (MCA) and art-science practice. Prophet particularly identifies those who work across or between art, science and technology (but whose works are none-the-less informed by MCA critical discourse) as *agent provocateurs* who do not sit comfortably in either NMA or MCA contexts. Thus these artists create a new nomadic and transdisciplinary way of working. This definition of the *agent provocateur* aligns with my experience of performing *Pulse Project* – as someone who works to provoke new thinking *between* these categories. See: Prophet, 2011, p.98-99.

⁹⁶ Refer to the Glossary in Appendix I for a definition of this term.

⁹⁷ *Leonardo* is an international society for the arts, sciences and technology, see *Leonardo*, n.d(a).

changed into 'digital arts,' then 'new media,' and on to 'artscience' before taking on its present incarnation as 'art, science and technology' (see Malina, 2015, n.p.). Presently, AST signifies an emerging global community of scholars and producers⁹⁸ whose works deploy interdisciplinary, multidisciplinary and transdisciplinary approaches to working across AST sectors. Some scholars, such as Jane Prophet (2011), define this emerging field as a hotly contested domain where passionate conflict erupts between the arts and sciences - conflicts that play out as power struggles within the laboratory.⁹⁹

Yet, I have my own personal trajectory within AST... Originally I came to the UK in 1994 to study with Helen Chadwick because my work shared affinities with Chadwick's artistic research, particularly her critique of the biomedical view of the body and fertility.¹⁰⁰ At that time, Chadwick was working on various 'sci-art' projects¹⁰¹ and was actively researching embryology and seeking out collaboration with embryologists¹⁰² that eventually led to the series titled *Unnatural Selection* (1996)¹⁰³ before her untimely death in 1996. This early experience of working across art and science under the tutelage of Helen Chadwick, whose work reflected a feminist reading of bioscience,¹⁰⁴ deeply influenced my own approach to artistic research. I mention this personal experience to call attention to the fact that AST describes a diverse and variable range of investigation across art, science and technology fields¹⁰⁵ and also to place my own practice in relation to an artist-

⁹⁸ This is particularly evidenced by communities such *Leonardo*, and also by events such as LASER/ DASER. See Leonardo, n.d(b). Also, Plymouth University's Planetary Collegium, which is founded and directed by Roy Ascott, has over the last two decades established AST research centers across the globe. See Plymouth University, n.d.

⁹⁹ Here I refer again to interdisciplinary artist-researcher Jane Prophet's experience of collaboration between artists and scientists at work in a laboratory context (from the standpoint of a contemporary artist). Prophet describes this territory as a contested battleground between art and science fields of practice – where interdisciplinary collaboration is more along the lines of 'cooperating treasonably, as with an enemy occupation force within one's country' (Prophet, 2011, p.97).

¹⁰⁰ I think it worth mentioning that Chadwick was influenced by Foucault's critique of the medical gaze, a critical stance that greatly informed her work during this period (see Ingham, 2010, p.251-253 and Walker 2013, pp.59-60). This is significant since Foucault will be discussed in relation to this project in Chapter Three,

¹⁰¹ See Chadwick's work in *The Body Visual*, (Arts Catalyst, 1996, n.p.) a bioart /art-medicine project, as just one example. See also O'Riordan's (2012, pp. 71-72) discussion of Chadwick's 'sci-art.'

¹⁰² Refer to Chadwick, 1987-1996, pp. 106-127, where she outlines her thoughts on eggs, embryos, visionality and also lists phone numbers and names of contacts of potential embryologist collaborators. This project occurred from late 1994 through to the end of 1995 – during the period when I was her student (I continued to stay in touch with her until her death in March 1996).

¹⁰³ According to O'Riordan (2012), this was a collaborative project between 'clinicians and patients at Kings College Hospital, and the members of HFEA [Human Fertilization and Embryo Authority] panel, as well as the trustees and staff of Arts Catalyst [UK Art and Science Charity]' (2012, p.86).

¹⁰⁴ For discussion on Chadwick's feminist approach to biomedicine see A. Ferrara's (2010) essay, 'Our Cells/ Ourselves: Sexual Politics in Bioart,' particularly pages 149 -154.

¹⁰⁵ For discussion of recent AST projects relevant to this research, see the section titled: 'Art, Science and Public Engagement: Relational Art as Science Experiment' in Chapter Five.

researcher who was an important pioneer in this field.¹⁰⁶

Using Chadwick's work as a point of reference and departure, *Unnatural Selection* presents a feminist critique of the clinical gaze. Chadwick uses microscopy to bring the ultimate potentiality of human life at its core essence (embryos)¹⁰⁷ into extra-human focus. In using the microscope and still embryos to create her images, Chadwick adopts the modernist¹⁰⁸ aerial (god-like) view that the clinical context enacts (see figures 2 and 3). In framing the embryonic cells in such a manner, Chadwick's luminous images (see Figure 3) are at once beguiling and monstrous, as she presents a view that tacitly involves the hard-core visual (and physical) invasion of women's wombs. At the same time, the image tacitly demonstrates the complete removal of the female womb-as-context for each embryo. Buck writes that Chadwick's visualisation of the embryos, as 'still lives' can:

'be read as a paradigm of the relentless eye of science, a symbol of our desire to probe and examine beyond horizons where sight can normally operate. Medicine originally developed sophisticated techniques for visualising the human foetus without having a specific clinical reason for doing so... "Unnatural Selection" engages with this insatiable human compulsion to look. But it offers another perspective to the supposedly disengaged, empirical eye of medical science.' (Buck, 1996, pp.36-37)

Thus *Unnatural Selection* presents a set of images that make a spectacle of scientific objectivity and/or the 'medical gaze',¹⁰⁹ and it is precisely Chadwick's feminist critique of the role of the empirical eye within the anatomical theatre of the clinic that forms the point of departure for this project.¹¹⁰ This project not only uses artistic practice to question the medical gaze, but it also questions the manner in which medicine and technology practices *perform* in the world. In my performances I use (CM) pulse diagnosis in order to

¹⁰⁶ See Bleeker, 2008, pp. 89-90 and O'Riordan, 2012, p.87 for discussion on how Chadwick's work greatly influenced subsequent art and science projects.

¹⁰⁷ Helen Chadwick plays with the concept of 'conception' (and with the idea of a 'Creator') in this work as she uses it to focus our attention on the first moments of human life. Yet in using donated embryos as material to produce art, the embryos were denied any future 'life' beyond their being viewed and contemplated. See O'Riordan, 2012, p.87 for details on the fate of the embryos donated for *Unnatural Selection*.

¹⁰⁸ Modern/Modernist is a term that covers too wide a range of cultural production to be adequately described here. Put simply, modern denotes both an era (some sources claim modernism to have begun at the close of the medieval era and is linked to industrialization - see: Berman, 2010, pp.15-36, Toulmin, 1990, pp.3-5 and Giddens, 1998, p.94) and a cultural/philosophical movement characterized by rejection of traditional, religious and agrarian societies in favour of rationalism, autonomous individualism, capitalist labour production, human perfectibility and the belief in scientific and technological progress (see Foucault, 1995, p.120 and Ross, 2009, p. 5).

¹⁰⁹ This term, coined by Michel Foucault is a concept Foucault develops throughout his significant work: *The Birth of the Clinic* (1973), particularly in chapters 7-9.

¹¹⁰ For me, listening to the body and researching alternatives to the allopathic medical body was my response to Chadwick's work and teaching. Consequently, this project is the culmination of my long-term struggle with finding new methods for critiquing the modernist medical gaze that begins where Chadwick left off.

provide a contrasting technique and approach to the way in which pulse diagnosis is conducted within orthodox medicine. In this way, my performances enable me to engage with others in ethically questioning *how* modern medicine and technology mediate and produce knowledge on the body and on the body/lifeworld relationship.

Investigating the roles science and technology play within society and how scientific knowledge is produced are also key concerns investigated by Science and Technology Studies (STS), which is explored in detail in the next section.



Figure 2: *Helen Chadwick Working with Embryonic Tissue at Kings College* (1996) [photo] Assisted Conception Unit Kings College Hospital, London. © Helen Chadwick Estate. Photo: Edward Woodman.

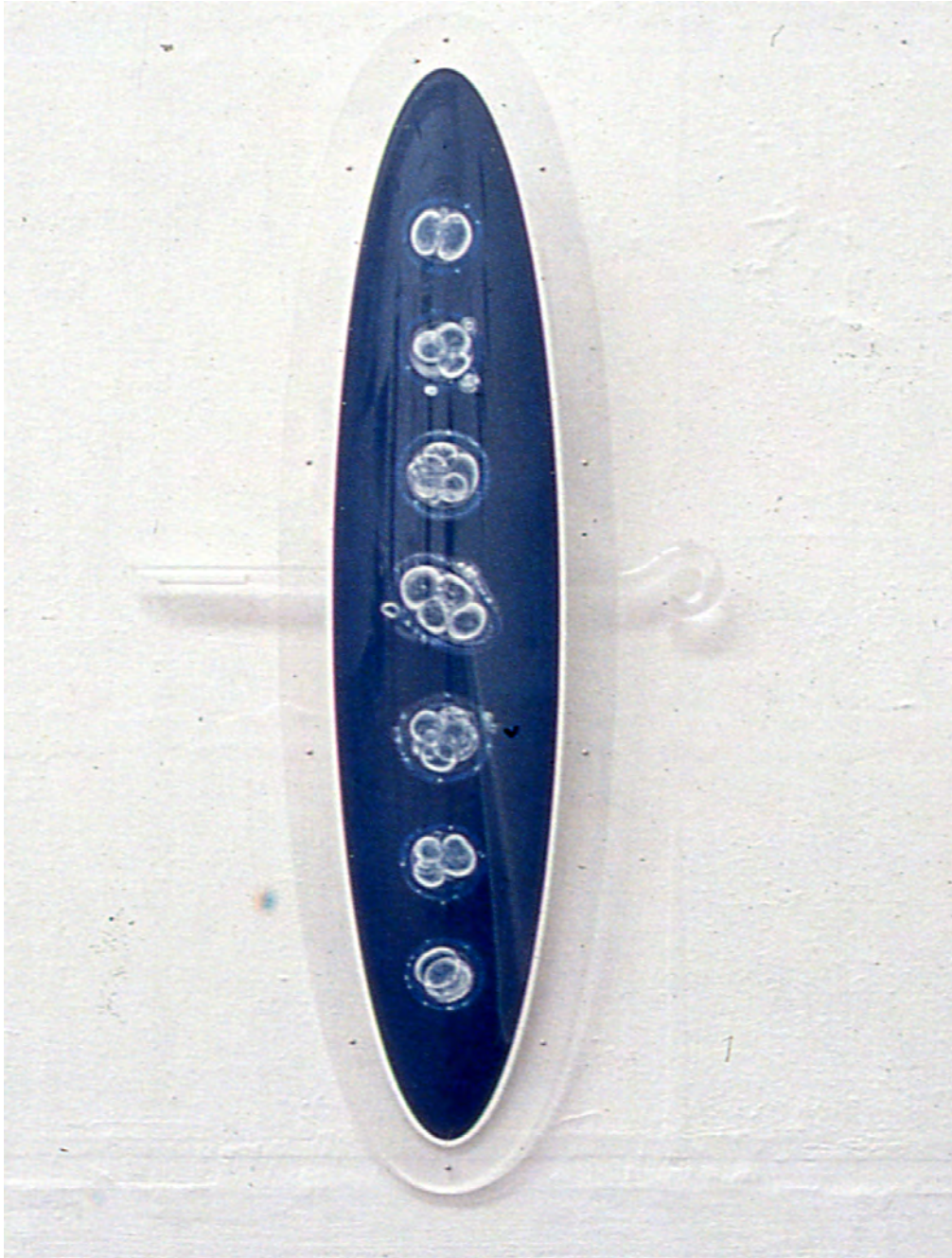


Figure 3: *Monstrance* (1996) [cibachrome, perspex], 115 x 31 x 5 cm. In: 'Body Visual,' Arts Catalyst © Helen Chadwick Estate. Photo: Jonathan Hill/Folly Pictures.

Feminist Science and Technology Studies

Discussion of STS in this section explores a selection of theories relevant to the ways in which this project combines artistic research with CM clinical practice to create a unique research encounter that ethically questions contemporary scientific and technological cultures in order to produce a 'successor science' (Harding, 1986). In keeping with Chadwick's feminist engagement with science and technology (ST), likewise this project

engages with the way in which feminist analyses of ST practices have asked similar questions to those raised in this project. Given the historical and dialectical complexity of feminist STS discourse, in this section I first provide a summary and analysis of key feminist STS theories before subsequently discussing their relevance to this project.

Feminist Critique of Objectivity and the View from Nowhere

'Objectivity has not always defined science. Nor is objectivity the same as truth or certainty... Objectivity... scruples to filter out the noise that undermines certainty. To be objective is to aspire to knowledge that bears no trace of the knower...'
(Daston and Galison, 2007, p.17)

Mary Maynard argues that one of the major ways feminists contribute to STS regards the question of power – particularly the manner in which feminist research extends: 'the ability of science and technology to make a difference [in society]' (Maynard, 1997, p.6), the way it can become 'a vehicle for critiquing modern western science, with a view to changing its very nature' (p.6), and the ways in which it seeks to 'understand the nature of science in relation to certain themes (colonialism or class for example), of which gender is just one' (p.6). Additionally, feminist critique further extends STS by questioning:

'whether the assumptions of positivism really reflect the ways in which natural science itself is practiced and the extent to which claims about value neutrality; rigorous methods and the search for objective facts are legitimate ... a mood of scepticism is developing as to what science actually is.' (Maynard, 1997, pp.5-6)

From mid-1980 onwards, especially during the *Science Wars* of the 1990's,¹¹¹ critiques of scientific objectification and neutrality (and in terms of this research - the politics of the medical gaze¹¹²) have been key areas of concern in STS discourse, particularly within feminist STS analysis. Beginning with some key contributions on this theme, Haraway (1988) and Nagel (1986)¹¹³ both describe scientific objectivity as the establishment of a

¹¹¹ The *Science Wars*, put simply, were a series of heated discussions that occurred at symposia and in academic journals between 'scientists and the social scientists who study them' (Beringer, 2001, p.2). The 'wars' started shortly after the authority of the scientific method and its capacity to produce objective truths were called into question by social scientists and feminist philosophers of science who adopted postmodern and constructivist theories. The scientific rationalists who saw themselves as 'representing' science, i.e., Alan Sokal, Steve Fuller, Lewis Wolpert, and social scientists representative of the academic left became embroiled in heated debates that sometimes became 'poisonous.' For example, Segerstrale (2000) gives a personal account of attending a conference at which scientists unfairly questioned panellist and feminist academic Donna Haraway (who was the only representative of the postmodern side of the debate) about her own and other feminist critics' scientific training. For discussion of the issues, length and intensity of the *Science Wars* see also Latour, 2004, pp.225-248 and Stengers, 2010.

¹¹² The gaze of science/medicine will be discussed further in 'The Body-Politic of the Medical Gaze' in Chapter Three.

¹¹³ Nagel's *The View from Nowhere* (1986) advances the notion that there are essentially two viewpoints of humanity, the subjective-individual viewpoint and an objective 'worldview' viewpoint (see Nagel, 1986, p.3). Nagel particularly calls for reconciling these often-disassociated viewpoints

'view from nowhere' – a perspective that is (supposedly) autonomous from individualistic relativism and therefore is enabled to authenticate and determine certain generalizable empirical truths and facts. Discussion in this section thus focuses on Haraway's (1988) 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective' as a landmark text that powerfully critiqued fundamental scientific concepts such as neutrality and objectivity. Haraway's text was written in response to Harding's (1986) 'The Science Question in Feminism,' in which Harding proposes Feminist Standpoint Theory as an alternative epistemology to the 'oppressive' biases and practices that underpin scientific claims of neutrality (see Harding, 1986, p.104; Harding, 2004, p.4).¹¹⁴ Feminist Standpoint Theory was also developed as an alternative to the politics of disassociation between subject and object within scientific epistemology.¹¹⁵

In 'Situated Knowledges' (1988), Haraway critiques objectivity as the hidden enactment of dominance politics and further argues that objectivity establishes a false unitary position whereby a thing observed can be separated from its socio-political context (like isolating an embryo from a woman's womb)... that objectivity essentially 'distance[s] the knowing subject from everybody and everything in the interests of unfettered power' (Haraway, 1988, p.581). In resonance with the critiques of objectivity that Feminist Standpoint Theory initially proposes, Haraway argues for an appropriate situating of knowledge production by creating a position of objectivity that adopts a responsible position (rather than an

within philosophy and science, which he identifies as being rooted within Cartesian mind-body dualism. Nagel questions the true objectivity of the mind when it comes to the complexity of physical experience and says there is always necessarily a gap between objectivity and ontological lifeworld relations. Yet, although Nagel argues for reconciling these points of view as a 'double vision,' he stills sees subjectivity and objectivity as opposites; whereas Haraway (1988), Harding and Hintikka (1983) and Harstock (1983) radically rethink the subjectivity-objectivity problem by situating objectivity from within an individual (subjective) standpoint.

¹¹⁴ Fox-Keller's *Reflections on Gender and Science* (1995) is also relevant to mention here as she argues that the practices of modern science themselves are gendered constructs. Fox-Keller makes particular connections between scientific objectivity and masculinity and also between the way modern science seeks autonomy through a radical dichotomization between cognitive-technical processes (processes that confer authority to the explicit and extrinsic) and embodied contingent processes of creativity, emotional maturity and experimental play (processes which are intrinsic, inter-relational and tacit). See Fox-Keller, 1995, pp. 75-94.

¹¹⁵ Harding writes that Standpoint Theory – a feminist epistemology that has courted controversy for over thirty years - was originally developed to critically engage with and challenge the 'cognitive, technical core of the natural sciences and their philosophies' (2004, p.26). In particular, the standpoint project aimed to question the authority of scientific objectivity and neutrality by developing an alternative position (Feminist Standpoint Theory) that aims to make more transparent 'how particular sciences... constituted their hypotheses and methods to meet the sexist and androcentric (and often racist and Eurocentric) needs of dominant social groups' (2004, p.26). Harding (2004) therefore argues that Feminist Standpoint Theory is better able to provide an account of the interplay between nature and culture through making more visible the hidden political relationships between observer-researchers and the objects under their scrutiny. Harding's identification of the racist and Eurocentric tendencies that underlie scientific neutrality is a concern that *Pulse Project* explores through using artistic practice to traverse across Chinese and European practices of medical science.

exclusive all-knowing position) that is able to account for power-relationships between observer and study subjects:

‘Above all, rational knowledge does not pretend to disengagement: to be from everywhere and so nowhere, to be free from interpretation... So science becomes the paradigmatic model, not of closure, but of that which is contestable and contested... not of what escapes human agency and responsibility in a realm above the fray, but, rather, of accountability and responsibility for translations and solidarities linking the cacophonous visions and visionary voices that characterize the knowledges of the subjugated.’ (Haraway, 1988, p.590)

Haraway’s statement thus addresses the shortcomings of modernist reductionism (see Footnote 108) and asks that knowledge production become more ethical by firstly acknowledging the complexity of subject-object interactions, and secondly, by critically situating the production of knowledge from within the specific set of exchange economies that exist in real terms between a researcher and institutional networks, knowledge discourses and research subjects. Therefore to aim at being objective in Haraway’s sense is to make more transparent one’s own (personal/social/political) relationships and thereby to identify the hidden stakes and interests arising from the practical exchanges taking place within research studies. For Haraway, if objectivity is to be grounded in the lifeworld, then it must be complex and include an ethics of accountability:

‘Feminist accountability [through critical positioning] requires a knowledge tuned to resonance, not dichotomy... Feminist embodiment then is not about a fixed location in a reified body, female or otherwise, but about nodes in fields, inflections in orientations, and responsibility for difference in material semiotic fields of meaning.’ (Haraway, 1988, p.588)

Thus Feminist Standpoint Theory and Situated Knowledges form arguments against the disavowal of that which does not adhere to modern science’s autocratic methods of measure, capture and knowledge production as ‘other’ or pseudoscience.¹¹⁶ This is especially relevant to the development of *Pulse Project* as my own passionate interest in

¹¹⁶ However, Feminist Standpoint Theory and Haraway’s Situated Knowledge Theory are not without controversy. These theories were developed against the backdrop of the *Science Wars* where the notions of scientific objectivity and value-neutrality were hotly contested for over twenty years – where Haraway in particular was sharply criticised as mentioned in Footnote 111. Additionally, Harding’s Standpoint Theory has been critiqued for being essentialist and relativist, for: ‘treating socially constructed categories as unitary’ (Gill, 1988, p.28), creating its own privileged neutral epistemology (see Hekman, 1997, p.349-355) and ‘advancing too many viewpoints... making them impossible to assess their empirical value’ (Longino, 1993, p.106-107). Harding is even charged with actively participating in the dichotomies she seeks to evade by not establishing a metanarrative in relation to her critique of masculinist objectivity (see Heckman, 1997, p.347). However, these initial criticisms perhaps hastily misread the radical implications Feminist Standpoint Theory poses for scientific epistemology. As Lykke (2010) points out in this section, by asserting that knowledge is socially situated and constructed (as well as relationally and intentionally constructed), knowledge production cannot be separated from its objectives. Therefore Feminist Standpoint Theory represents a nuanced and complex strategy that can be used for many different purposes by diverse groups in ways that can account for each aim and interest... a conversational/relational (rather than hegemonic) form of science production.

science (particularly my practice of CM) - is labelled a 'pseudoscience' by modern medical science. *Pulse Project* thus aligns with and creates its own adaptation of Harding's Standpoint Theory and Haraway's Situated Knowledge Theory by producing an ethnographic (situated), participatory and accountable knowledge practice.¹¹⁷ Moreover, by developing a touch-as-listening methodology, this project engages in inter-relational and co-productive forms meaning-creation. Not only do *Pulse Project* performances create artistic records of the social and dialogic aspects of research creation, but they also produce participatory feedback mechanisms that empirically test out the social relevance and ethical responsiveness of this project's knowledge production.

Moreover, the aims and objectives of *Pulse Project* align with and create new interpretations of Harding's proposal for a 'successor science' (1986). Harding's successor science is the creation of a science that not only challenges the biases of modernity such as the ties neutrality and objectivity share with masculinist, classist and racist agendas (see Harding, 2004, p.26; Fox-Keller, 1995, p.75; Collins, 1986, S.18),¹¹⁸ but also actively challenges the epistemological and ontological foundations upon which scientific knowledge is currently produced. As Lykke (2010) writes:

'Knowledge practices are not neutral... but dependant on the knower's contextualisation in time, space, historical power relations, bodies and so on. Therefore, Harding argues, it does not solve the problem to produce a successor science in which women are made visible, The crucial point is that profoundly new research questions are needed.' (2010, pp.18-19)

This quote by Lykke is also used here to make the point that although *Pulse Project* is informed by feminist STS discourse, this project additionally addresses the production of ST in society from intercultural, post-colonial and historical perspectives and so attends to Harding's concerns that successor science address not only women's interests, but that it also engage with the wider challenges posed by imbalances of power throughout the world – that successor science projects produce 'anticlass, antiracist, multicultural and anti-imperialist' (Harding, 2004, p.26) forms of knowledge.

The discussion of Feminist Science and Technology Studies as presented in this section now brings me to a central concern of this thesis - the development of a successor science practice. To this end, the artistic research and outputs of this project investigate medicine and technology by utilising the human body itself as a technology for creating new insights regarding the 'nature' of the relational (human) body.¹¹⁹ In this way, *Pulse*

¹¹⁷ My participatory research methods not only engage participants in activities, they require critical feedback from participants, making the research process more ethical and accountable.

¹¹⁸ Sociologist P.H. Collins also argued for adopting Feminist Standpoint Theory to address racist and classist exclusion via the devaluation of the subjective experiences of marginalized groups (see Collins, 1986, p.S18).

¹¹⁹ The artistic study of interactions between the human body and social bodies of knowledge

Project uses artistic research and CM together to offer an alternative practice to modern techno-medical production, and in so doing, it creates a new successor science practice.

Scott's (1998) query frames *Pulse Project's* successor science aims more clearly by asking: if medicines other than modern allopathic medicine can be said to 'work,' then 'what are the implications for our [Western/Eurocentric] metaphysics? In what reality might these sort of [interventional practices] have an intrinsic place?' (1998, p.22). *Pulse Project* investigates these questions by restaging the CM clinical encounter within the context of artistic research to identify and question Western/Eurocentric thinking on the body whilst simultaneously investigating new methods for attending to others as the development of a new caring practice. *Pulse Project* 'cares' by listening intensely to each person's specific physiological psycho-spiritual emergences as they intertwine with lifeworld processes.

Thus, each artwork materialises the cartography of an individual's bespoke body-lifeworld relationship in time-space as well as new understanding of the rhythmic intercommunications that cross *between* living bodies and environmental time-spaces. Consequently, *Pulse Project* uses diagnostic touch to challenge the objective and hegemonic doctor/patient - self/other dynamics¹²⁰ within orthodox medical encounters by creating diagnostic encounters that advance unique and more accountable articulations of embodied, entangled and intercommunicative ways of knowing.

The Intersectional Body

As a key question in this thesis is 'How and what is a body?', this project investigates this concern by producing a body of work that reflects upon the intersectional ecologies of the human body - both in its relation to transdisciplinary AST practices and in relation to

(e.g., social, technical, disciplinary and cultural knowledge practices) form the central premise of this thesis. Consequently these relationships are explored throughout subsequent chapters of this thesis, particularly chapters three, four and five.

¹²⁰ Throughout my clinical training and practice, I have disliked the terms 'doctor' and 'patient' as I feel they set up an unhelpful power dynamic and interpersonal expectation within the clinical encounter. The all-knowing active doctor takes responsibility for healing the passive unknowing patient... a situation that discourages healing through the auspices of a person's own self-discovery and care. The doctor/patient litany can be traced to the establishment of hospitals and hospices in medieval Europe where the dynamics between physicians and the infirm developed out of the confessional - since illness was considered an extension of personal sin. For further reading on this development see Kay and Rubin, 1996, pp. 46-49. However, I view the clinical encounter as a philosophical encounter where a person arrives with a question involving complications (both physical and spiritual) arising from their experiential navigation of the lifeworld, rather than from their simply having an illness. This clinical approach allows a person with a malady-question to search for answers themselves and to embody these answers as their stake in their own healing. For this reason, I refer to myself as: 'physician-researcher' and the client as: 'querent.'

nonhuman¹²¹ entities and processes such as digital programming/communications, electronic sound, *qi* and *yīnyáng*.¹²² For this reason, this section contextualises *Pulse Project's* investigations of the body by examining a specific selection¹²³ of intersectional¹²⁴ embodiment theories¹²⁵ as they relate to investigating how and what the body is – or could be.

Beginning with a sociological account, Shilling identifies the body as a 'project' of the modern era by stating that:

'In the affluent West, there is the tendency for the body to be seen as an entity which is in the process of becoming; a project which should be worked at and accomplished as part of an individual's self-identity.' (Shilling, 2003, p.4)

Yet Shilling resists any determination of what bodies are by stating that although we have unprecedented means 'to exert control over bodies, there still exists a radical doubt as to what bodies are' (2003, p.3) and that 'medical and other technical interventions into the body also highlight the biological and social character of the body and have made it more difficult to grasp exactly what the body is' (2003, p.11). Shilling also addresses a definitive absence of situated and interiorised (embodied) accounts of the body, which he attributes to unhelpful bifurcations of nature/culture and mind/body within the main trajectory of social science literature.

'The human body has been evolving for thousands of years and forms a very real base for social relations... it is important to recognise that the body is not simply constrained by or invested with social relations, but also actually forms a basis for and processes productive capacities which *contribute towards* these relations... to serve and shape those relations.' (Schilling, 2003, pp.4, 10-12)

Here Schilling acknowledges the body not only in relation to social contexts (inclusive of the multiple dynamics that divisions in class, race and wealth create), but he also foregrounds the dynamic creative production that the body materialises in the world through its intentional relationship with the social. Shilling's critical yet speculatively open

¹²¹ This term refers to a concept advanced by Donna Haraway when she first questioned the human/nonhuman divide in: *A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century*. See Haraway, 1991, pp.149-181. Also see Grusin, 2015, *The Nonhuman Turn* for a more current and comprehensive analysis of this theme.

¹²² Refer to the Glossary for a definition of these terms. *Qi* and *yīnyáng* are also elaborated on in chapters three and four.

¹²³ Given the complexity of conducting a comparative analyses of practice-based objectives and outcomes in relation to multiple fields of disciplinary knowledge and the limited word count, this discussion of embodiment theories is limited to those theories that are the most relevant to the aims and objectives as identified by my artistic research practice.

¹²⁴ I do not view bodies as discrete entities that are separate from their environment, but as intersectional organisms that interact with the lifeworld through embodied processes that are both internal (physiological/psychological/spiritual) and external (the body as it engages with human and nonhuman entities that are animate within the lifeworld).

¹²⁵ The scholars Csordas, 1990, p. 5; Shilling, 2003, p.4 and Kreiger, 2005, p.350, all argue that embodiment is a subject that cannot be contained within one discipline.

investigation of the social ecology of the body sympathetically aligns with the questioning of how and what the body is within this thesis. Moreover, Shilling argues that medicine and technoscience often act in advance of deeper reflection on how their interventions might shape or negatively influence the understanding and maintaining of human bodies (see Shilling, 2003, pp.3-4). Shilling's call for greater ethical reflection on what the body comprises and also on techno-medical intervention of the body aligns with this project's investigation of how and what the body is in relation to techno-medicine. By adapting a premodern medical technique to investigate the interplay between the body, medicine and technology, this project interrupts the logic of techno-medical accelerationism¹²⁶ and allows for thinking of alternate ways to produce human wellbeing. Moreover, this project explores human bioprocesses (embodiment) through exploring the way in which the body itself (as a technology) shapes and produces knowledge.

This body/society/medicine axis can be explored further through the medical anthropology account of embodiment, where the focus of study shifts towards a physiological and problem solving approach. Krieger (2005) defines embodiment as:

‘a multilevel phenomenon, as it necessarily entails the interplay between bodies, components of bodies, and the world(s) in which the bodies live... Among these levels are: micro phenomena within the body, for example, the physiology of sight, the biochemistry of muscle cell contraction; macro phenomena, for example, the evolution of ecosystems... and meso phenomena... Embodiment, as a construct, usefully invites considering connections between these different levels when developing explanations at any particular level.’ (2005, p.353)

Here Krieger defines the body as a relational organism that comprises different narrational layers that reveal its relations with socio-cultural circumstances – such as security, poverty and poor sanitation and so on. Yet, Krieger's epidemiological definition of embodiment does not focus on the body as an active and creative co-producer of its socio-cultural environment, as Shilling (2003) asserts above, but defines it more as a passive (yet complex) object of study – as an entity that offers its ‘stories’ and secrets to a knowing physician/epidemiologist in ways that either language or the person themselves are unable to express (see Krieger, 2005, p.350).¹²⁷

Conversely, *Pulse Project* addresses the act of medicine in society through using artistic methods that test social perception of the biomedical model, e.g., to fix and perfect

¹²⁶ This term, coined by Williams and Srnicek (2013) refers to the increasing speed of technological innovations that are in advance of human society (see Williams and Srnicek, 2013).

¹²⁷ As Krieger writes: ‘Recognising that we, as humans, are simultaneously social beings and biological organisms, the notion of “embodiment” advances three critical claims: (1) bodies tell stories about—and cannot be studied divorced from—the conditions of our existence; (2) bodies tell stories that often—but not always—match people's stated accounts; and (3) bodies tell stories that people cannot or will not tell, either because they are unable, forbidden, or choose not to tell.’ (2004, p.350)

the ill body. *Pulse Project's* methods of medical investigation require playful collaboration and interpersonal discussion as integral and fundamental to building medical knowledge of the body – as participants are encouraged and enabled to provide feedback on their experiences to the physician-researcher. *Pulse Project's* participatory research methods¹²⁸ create new practices for speculating upon the spiritual and creative production of socio-cultural environments that bodies co-produce together within the medical encounter. *Pulse Project's* artistic methods thus form an ethical addition to and innovation of the 'objective' problem-solving capacities of medical knowledge production.

From a feminist perspective,¹²⁹ the interplay between the body, society and technology remains an enduring concern – with a significant portion of feminist literature addressing, and in some cases perpetuating, the mind-body dichotomy.¹³⁰ To overturn this long-standing litany of mind/body dualism that has influenced and shaped Western reason (see Grosz, 1994, p.3), Grosz calls for reconsideration of what the body is and does by arguing that representations of the body within culture aim to reflect the body as a *living* organism.¹³¹ Grosz argues that knowledge production of the body and embodiment should engage more with the complexity of the body's intersectional dynamics by producing

¹²⁸ These include conversational dialogue with participants within the performance situation and also within email correspondences, feedback logs and collaborative works. These research methods are elaborated on in 'Participant Engagement and Feedback' in Chapter Four.

¹²⁹ Given the depth and breadth of feminist literature on the body and embodiment and the very limited scope for creating a comprehensive discussion on this topic within this thesis, my main engagement with feminist discourse focuses on feminist STS studies (as already outlined in previous sections of this chapter) as it relates more intimately with this project. This section thus limits discussion of feminist discourse on embodied intersectionality to a few key concepts that relate to the investigations of this project.

¹³⁰ Orr (2007) opens discussion of the mind/body problem via examining perspectives of first and second wave feminist authors and points out that mind/body dualism was not just enacted by men to subjugate women, but was also enacted within feminist discourse. Since rationalism and neutrality were identified as male traits and emotionality and corporeality as female, first and second wave feminist texts tended to adopt first a rationalist (reason-based) and later an anti-rationalist (body-based) approach, thereby perpetuating mind/body dichotomies within feminist discourse (see Orr, 2007, pp.19-20). Along similar lines, feminist scholar Elizabeth Grosz writes: 'Feminism has uncritically adopted many philosophical assumptions regarding the role of the body in social, political, cultural, psychical, and sexual life and, in this sense at least, can be regarded as complicit in the misogyny that characterises Western reason' (Grosz, 1994, p.3). However, the confusion and complicity Grosz and Orr address here is understandable when considering the mind/body paradigm would require considerable time to work through given its lengthy duration within the history of Western thought. For example, Johnson (2014) describes how the body-soul dynamic in sixteenth and seventeenth century literature delineated the rational soul (with its transcendent faculties) to men and the body (with its connection to being animal) to women - 'thus naturalizing women's social and political subordination to men' (2014, p.163).

¹³¹ Grosz acknowledges the following: 'Luce Irigaray, Hélène Cixous, Gayatri Spivak, Jane Gallop, Moira Gatens, Vicki Kirby, Judith Butler, Naomi Schor, Monique Wittig, and many others' (Grosz, 1994, p.17) as authors who undermine dichotomous thinking to instead develop theories of what Grosz terms 'the lived body' (see 1994, p.18). Grosz goes on to describe the lived body as 'the political, social, and cultural object par excellence, not a product of a raw, passive nature that is civilized, overlaid, polished by culture. The body is a cultural interweaving and production of nature' (Grosz, 1994, p.19).

knowledge from the integration of the body's internal processes, e.g., physiological and psychological, with its external processes, e.g., embodied physiological and socio-cultural exchanges with the world. To this end, Grosz suggests that:

Only when the relation between mind and body is adequately retheorized can we understand the contributions of the body to the production of knowledge systems, regimes of representation, cultural production, and socioeconomic exchange' (Grosz, 1994, p.19).

Grosz's elaboration on the body as an intersectional site for knowledge production and complex exchange aligns with this project's investigations of embodiment. *Pulse Project* rethinks the mind-body-society relationship and creates new knowledge of the body through using practice-based and participatory processes that investigate and develop new social relationships between bodies, medicine and technology.¹³² This project also offers an alternative to Western (Euro-American) embodiment theories to provoke a reconsideration of the mind-body-society relationship towards an intercultural perspective that extends the socio-cultural production of embodied knowledge beyond the limits of Western ethnocentrism.

Likewise, Csordas's (1993) anthropological elaboration of embodiment as the intersectional relationship between perceptual bodily experiences and cultural practices relate to *Pulse Project's* investigations. Csordas defines the body as an organism of 'somatic modes of attention' that, within social environments, produce 'culturally elaborated ways of attending to and with one's body in surroundings that include the embodied presence of others' (Csordas, 1993, p.135). By adopting the clinical encounter as a frame for investigating the body in relation to others' bodies and social environments and also by using diagnostic touch as an art-medicine research method, this project materialises the intersectional body-society axis by recording and giving shape to the intersections where the interior-exterior/self-other emergences can be seen, heard and perceived in new ways.

Merleau-Ponty's writings on the body and lived experience also share important correspondences with this project, particularly Merleau-Ponty's development of a 'phenomenology of perception' (1962) and an ontology of the 'flesh' (1968).¹³³ In *Visible and the Invisible* (1968), Merleau-Ponty critiques the persistence of the mind/body paradigm as an oversight of Western philosophy, particularly the distinct lack of more nuanced philosophies of the body, bodily perception and body-world relations – a view

¹³² These research processes are discussed throughout chapters four and five.

¹³³ Again, it is important to acknowledge that this section provides a limited account of Merleau-Ponty's important theories, which have made contributions to philosophy psychology, cultural theory, and many other fields too numerous to mention here – as this discussion focuses on theories relevant to this project.

echoed throughout this section.¹³⁴ In response to this oversight, Merleau-Ponty broke away from the subject-object ontology in philosophy¹³⁵ (which included the work of his teacher Husserl),¹³⁶ so he could advance a philosophy on a 'flesh of things that speaks to us of our own flesh and that speaks to us of the flesh of the other' (Merleau-Ponty, 1968, p.193) - an ontological development that Merleau-Ponty argues 'requires a complete reconstruction of philosophy' (1968, p.193).

In terms of this project, what is significant is Merleau-Ponty's identification of the body as a living somatic organism (as opposed to an object of essences) with a highly perceptive and non-transcendental consciousness¹³⁷ that dynamically emerges¹³⁸ and intertwines with the socio-cultural and environmental 'fabric' of existence (1968, p.6). This understanding of the body as intersection comes very close to the CM notion of the body that this project elaborates upon.¹³⁹

Yet, when comparing Merleau-Ponty's arguments with CM elaboration of the body, Merleau-Ponty's concepts remain somewhat general and abstract - as his discussion of lived experience is without the specificity of the way bodily processes entangle with lifeworld situations - which does present a problem for true evaluation of embodied experiential knowledge.¹⁴⁰

This project elaborates on Merleau-Ponty's critique of Western mind/body dualism and his development of an 'ontology of the flesh' by using CM to demonstrate a knowledge practice that has, for at least one millennium, already developed an ontology of the body that integrates mind/body/culture/nature in ways that articulate and apprehend the temporal specificity of body-environment relations.

Lastly, while there is limited scope in this thesis for presenting a complete account of embodiment discourse in relation to *Pulse Project's* objectives and outcomes, it is

¹³⁴ Merleau-Ponty's critiques Western metaphysics and Cartesianism as wholly inadequate for describing and including embodied lived experience (see Merleau-Ponty, 1968, pp.187-188), and by doing so, he offered a major contribution to feminist reconceptualizations of the body - a debt Grosz's herself acknowledges in her writing on embodiment and Merleau-Ponty (see Grosz, 1994, p.94).

¹³⁵ See also Carmen's (1999) discussion of Merleau-Ponty's attack of schematism in Kant's *Critique of Pure Reason* (1855 [1791]), which divides body and mind by creating a distinction between sensibility (perception) and cognitive understanding. See Carmen, 1999, pp. 218-222.

¹³⁶ For further reading on this topic, see Carmen, 1999, pp. 205-206.

¹³⁷ See Merleau-Ponty, 1968, pp.168-169 to read his critique of Bergson's transcendental representations regarding time and consciousness as a 'Male-branch representation of a vision of god' that advances the notion of consciousness as 'transcendental' (1968, p.194).

¹³⁸ This emergence of consciousness is Merleau-Ponty's elaboration of 'intentionality,' which he identifies as a bodily activity instead of as a purely transcendental cognitive function. See Carmen, 1999, pp.214-218 for discussion on this theme.

¹³⁹ This is referred to as the *bodymind* in many contemporary translations of CM texts. This concept will be discussed in greater detail throughout Chapter Three.

¹⁴⁰ See Grosz, 1994, p.94 for discussion of this limitation in Merleau-Ponty's writings.

important to include, however briefly, a performance studies perspective on embodiment because it relates to this project's aim of developing and critically engaging with an intercultural understanding of embodiment through performance. To this end, Schechner writes:

'In performance studies, questions of embodiment, action, behaviour and agency are dealt with interculturally. This approach recognizes two things. First, in today's world, cultures are always interacting – there are no totally isolated groups. Second, the differences among cultures are so profound that no theory of performance is universal: one size cannot fit all. Nor are the playing fields where cultures interact level. The current means of cultural interaction – globalization – enacts extreme imbalances of money, power, access to media and control over resources.' (Schechner, 2013, pp.2-3)

By performing within the contexts of European institutions and public spaces, *Pulse Project* performances use CM practices to question and experiment with an intercultural imaginary to widen European ethnocentrism towards greater understanding of and interaction with diverse approaches to what and how bodies function and what medicine can be if view from another perspective. In this way *Pulse Project* additionally investigates intercultural articulations of intersectional embodiment.

The Clinic, *Gestell* and Performative Practice

The Technological Frame of the Clinic

Given that *Pulse Project* uses the frame of the clinical encounter as its main investigative tool for examining socio-technological relations between the human body and (so-called)¹⁴¹ nonhuman¹⁴² phenomena, this section opens discussion of *Pulse Project's* meta-clinical investigation in relation to Heidegger's concept of *Gestell* or 'enframing' as the essence of technology (see Heidegger, 1977, pp.304-305).

In 'The Question Concerning Technology' (1977) Heidegger argues that the

¹⁴¹ I say so-called because the term nonhuman assumes a human/nonhuman divide, a situation that does not exist according to Chinese medical philosophy. Though contemporary theorists argue for a rethinking of the balance between human and nonhuman agency and emergence, the trajectory of Chinese philosophical thought resisted framing reality in this way. CM instead observes the ecological integrations of human, technical, cultural and natural emergences. An example of a nonhuman concept in CM is perhaps best characterized by the concept of *qi* (see the Glossary for a definition) – a substance that is the substrate of the both human and extra-human existence and is a cosmic substance. These concepts are discussed in greater detail throughout Chapter Three.

¹⁴² Posthuman discourse is characterised by critical engagement with the question of 'the human' or humanity as it relates to current cultural, technological and historical situations. See: Pepperell, 1995; Hayles, 1999; Wolfe, 2009; Braidotti, 2013; whereas Nonhuman discourse can be characterised as a critique of the anthropomorphic determination and/or exploitation of nature, culture and technology. See: Pickering, 1993; Haraway, 2003; Latour, 2005; Grusin, 2015.

(modern)¹⁴³ development of technology contains within its teleology a 'dangerous approach' to producing or revealing knowledge of nature. This is because (according to Heidegger) the essential human orientation to nature is motivated by desire for control – that we situate ourselves in dominion over nature by deploying instruments to enframe it.¹⁴⁴ Moreover, Heidegger was acutely concerned by the overall lack of criticism regarding the ways technological enframing exploits and consumes the very aspects of nature it seeks to produce knowledge from (see Heidegger, 1977, pp.305-309). He thus argued that the organisation of nature into a mere calculation or into a system of information places nature (and eventually humanity) in 'standing-reserve.'¹⁴⁵ Consequently, enframing forecloses upon what could be a more liberating use of technology, i.e., as a tool for generating poetic rather than purely technical knowledge of nature (see Heidegger, 1977, p.310-312).

In response, Heidegger argues we must not simply engineer truth via the framework of a hypothesis as an *a priori* (as enframing), but that as we have a duty to care for the lifeworld we are a part of, we must produce knowledge of nature by understanding it on its own terms (see Heidegger, 1977, pp.314).¹⁴⁶ Heidegger subsequently argues that if we instead activate our intuitive and creative intentions towards knowledge production (as a technology), this poetic approach has potential to rescue humanity from an exploitative orientation to nature and also from obsolescence to the technological. Hence, if we adopt poetic process as central and integral to technological knowledge production, there is then the potential to transform technology into an instrumentality that participates in (rather than exploits) the revealing and unfolding of mysterious 'truths' of living and being in the world (see Heidegger, 1977, pp.314-317).¹⁴⁷

¹⁴³ 'Modern' is my addition to Heidegger's argument.

¹⁴⁴ Heidegger particularly accuses the sciences of the instrumental enframing of the lifeworld for its own ends – engaging in an 'exploitative' relationship to the lifeworld. See Heidegger, 1977, pp.305-307.

¹⁴⁵ 'Standing-reserve' refers to placing a lifeworld object (the enframed) in a position of servitude to the technological (the systems of enframing). This creates a relationship of dominance and usury. Furthermore, Heidegger feels this could have a catastrophic and apocalyptic effect on humanity and the natural environment if they both come to be made to 'stand in reserve' to the technological, i.e., as mere resource materials for the ends of technological advancement. See: Heidegger, 1977, pp. 306-309.

¹⁴⁶ This point is one of the reasons why this project uses practice to lead the investigation.

¹⁴⁷ There are, however, challenges to Heidegger's position on technology, particularly coming from Accelerationism theorists Williams and Srnicek (2013) who argue that rather than slow down and reassess what technology *is* or what our relationship with technology has become, we should instead 'unleash latent productive forces... the material platform of neoliberalism does not need to be destroyed. It needs to be repurposed towards common ends. The existing infrastructure is not a capitalist stage to be smashed, but a springboard to launch towards post-capitalism' (2013, n.p). In their manifesto, Williams and Srnicek call for unfettered expansion of the technological beyond the human. Yet, their call to re-ignite 'Promethean politics mastery over society and its environment' (Williams and Srnicek, 2013, n.p.) has firm roots in modernist and Enlightenment thought... with a

Pulse Project performances align with Heidegger's (1977) discussion on *Gestell* by using the frame of the clinical encounter to investigate the body-technology-nature politic of the modern¹⁴⁸ biomedical clinic.¹⁴⁹ Yet, in using hand, mind and heart together to create new knowledge (see Rose, 1983), this project uses creative intuition and embodied measurement of natural phenomena, e.g., using an artistic adaptation of CM pulse diagnosis, to participate in the production of knowledge as technology. By using practice-based research to engage with the time-based, inter-relational and unknown movements of living and being, this project's reorientation of the way knowledge is performed and produced thus reveals new immersive understandings about the processes of creating knowledge from being in the world.

Practice, Performance and the Clinic

This section extends discussion of *Gestell* and the clinic presented above by examining the roles practice and performance play within the frame of research studies. Sociologist Karin Knorr-Cetina (2001) reflects on the performative aspect of Heidegger's *Gestell* when she writes about the way enframing processes of scientific knowledge production are always partial and already linked to the unfolding of hidden and unknowable processes that extend beyond the framework of the objects of study:

'In this sense these objects are meaning-producing and practice-generating; they provide for the concatenation and constructive extension of practice. One can also say the significance of these entities resides in the lack they display and in the suggestions they contain for further unfolding.' (Knorr-Cetina, 2001, p.184)

Knorr-Cetina further argues that the study of objects reveals the 'relational undergirding of epistemic practice' (Knorr-Cetina, 2001, p.178) because objects are always incomplete and partial. Objects are not simply partial, but they are also subject to the temporal unfolding of the lifeworld. At the same time, each object contains within itself 'sub-links' (Knorr-Cetina, 2001, p.184) to other processes. Objectual studies are fired by imagination (exploring what might be) and desire (the will to know more) (see Knorr-Cetina, 2001, p.183) – this is especially so because epistemic objects are partial, 'transient, internally complex, signifying entities [that] allow for the continuation of [other] sequence[s]' (2001,

will to subordinate nature. As Bassett (2015) argues, although Williams's and Srnicek's 'Accelerate Manifesto' (2013) does open onto new critical positions in relation to the contemporary, their arguments valorise 'abstractions' (see Bassett, 2015, p.140) and place bodies and 'specific operations' as 'subordinate to the computational itself' (2015, p.140). Bassett further argues that Williams and Srnicek (2013) do not learn from – and in fact wholly ignore – feminist technological discussions regarding embodiment or social politics and the interrelationship between technology and socio-material production (see Bassett, 2015, p.140).

¹⁴⁸ See Footnote 108 for a discussion on modernism.

¹⁴⁹ See Shilling, 2003, pp.3-4 for discussion of the body's relationship to technoscience and also see further discussion of how the body is viewed within the paradigm of the modern clinic in Chapter Three in the section 'The Body-politic of the Medical Gaze.'

p.183). Thus the contingent partiality of knowledge that objects produce always leads onto further study and practice. This unfolding chain of partial objectual relations within study frameworks that subsequently generate further study highlights the creative intentionality (via desire to know) and performative aspects (carrying out methodical processes that reveal knowledge) of scientific knowledge production.

Physicist and feminist scholar Karen Barad (2007) takes Knorr-Cetina's (2001) notion of the performative interplay between objects and studies yet further by addressing how the relationships between study objects, the performative agency of study actors and study outcomes come together to produce an 'entangled state of agencies' (Barad, 2007, p.22). By calling attention to the entangled and processual aspects of knowing and being, Barad (2007) both questions the withdrawal of the human as a relevant party to scientific knowledge production (this approach recalls Heidegger's 'standing-reserve' criticism) and also offers a solution to this problem by pointing out that the interactivity between researchers and practices is actually what produces knowledge – that: 'we are a part of the knowledge we seek to understand' (Barad, 2007, p.26).¹⁵⁰

By stating: 'Significantly, phenomena are not merely laboratory creations but basic units of reality' (Barad, 2007, p.33), Barad shifts focus away from epistemological practices that separate matter from their complex unfoldings within time-space¹⁵¹ towards measuring and understanding phenomena not as 'absolute' but as partial entities – entities that only emerge through their mutual 'intra-action' between 'agencies'¹⁵² in time-space (see Barad, 2007, p.33). Barad elucidates upon the significance of this shift by saying: 'The shift from a metaphysics of things to phenomena makes an enormous difference in understanding the nature of science and ontological, epistemological, and ethical issues more generally' (p.33).

Barad's onto-epistemology¹⁵³ - her postulation that the researcher, research apparatus

¹⁵⁰ This concept refers back to Merleau-Ponty's *Phenomenology of Perception* (1962) and Heidegger's call to free the (scientific) study of objects from the reductive tendency of technical causation towards embracing the sensual complexity of objectual relations as they unfold in the lifeworld (*Dasein*) (see Heidegger, 1962, pp.78-78). However, is it important to distinguish here the divergences between Heidegger and Barad in their approach to scientific knowledge production. Heidegger upholds an anthropocentric approach to technology, where he places the human in the centre of technology-nature problem (see Glazebrook, 2012, pp.178-179). Whereas Barad calls attention to the material realities of inter-relations between objects, agents/bodies and 'historical forces' that do not feature the human as central to the production of knowledge, but as co-producer of knowledge (see Mannion and Gilbert, 2015, p.232; Barad, 2003, p.809).

¹⁵¹ Again – this is a form of what Heidegger refers to as 'standing-reserve' (see Heidegger, 1977, p.306).

¹⁵² This refers to agencies such as researchers, discursive studies, phenomena and space-time processes.

¹⁵³ Barad coined the term onto-epistemology, which describes the intertwining of knowledge practice with the study of being. For further discussion of this term, see Barad, 2007, Chapter Four. Additionally, Barad mentions that ethics are intimately entangled within onto-epistemological

and research objects within knowledge production (as epistemology) are indissoluble from the multiple emergences of intra-related material agencies within flow of time-space (as ontology) - corresponds to this thesis's third research question concerning metaphysics. This project uses touch, sound and CM practice together (as artistic research) to question metaphysical causation as it has been shaped by Western thought.¹⁵⁴ In so doing, it reveals new material expressions and understandings on the ways (causality) the body, society, knowledge systems and space-time interact and transform. To this end, *Pulse Project* performances explore premodern¹⁵⁵ pulse analysis as a method that interconnects researcher and participants with the performative act of knowing. *Pulse Project's* pulse readings provide a new practice for both gaining insight on the rhythmic emergences of the body (as a state of health) – and through the intra-active process of reading pulses – new insight on and measurement of the rhythmic and patterned emergences of being as inter-relational... a being *with* others in a moving world.

Moreover, sound is a medium of entangled agencies *par excellence*. It moves, is polyrhythmic, poly-layered, immersive... it flows and vibrates within, around and through multiple bodies in space-time. Sound waves produce the effect of 'sound' by agitating and enveloping all matter in its trajectory. Accordingly, this project uses sound and touch to provide an alternative means for modern technological enframing and measuring to, as Barad (2007) writes:

'challenge our Cartesian habits of mind, [and break] down the visual metaphors for knowing along with its optics of mediated sight. Knowledge making is not a mediated activity, despite the common refrain to the contrary. Knowing is a direct material engagement, a practice of intra-acting with the world as part of the world in its dynamic material configuring, its ongoing articulation. The entangled practices of knowing and being are material practices.' (2007, p.379)

The sound works of this study subsequently provide an alternate means with which to situate oneself towards producing scientific knowledge by side-stepping the mediating and distancing aspects of sight, as Barad (2007) outlines above, in favour of utilising the immersive qualities of sound to materialise bodies *as sound*... bodies of sound that in

studies as one cannot separate 'knowing, [and] being [from] valuing' (Barad, 2007, p.409).

¹⁵⁴ Here I give brief definitions of Western and Chinese metaphysics. Western metaphysics is the traditional (Aristotelian) study of the existence of things through using science and art (as an epistemological tools) to determine the causal relationships between discrete essences, matter as a substrate, the source of their interaction (God) and their purpose for being transformed (which is for the betterment of life). See Aristotle, 350 BC, Book 1, Parts I, II, III. In Chinese metaphysics, the causality between essences and phenomena differs as these elements are not separate or absolute, but are inter-relating, mutually generating, constantly emerging and changing agencies that are subject to the movements (*xing*) of local, planetary and cosmic phenomenological phases. Moreover, the source of their transformations (*dao*) is indeterminate. See Li and Perkins, 2015, pp. 1-5 and 'The Body-Ecological' in Chapter Three of this thesis for further discussion on Chinese metaphysics.

¹⁵⁵ See also Salter's discussion of the premodern as a 'world without cuts' (Salter, 2010, p.xxxi) between knowing and being in the 'Research Questions' section of the Introduction.

themselves offer new ways for experiencing and perceiving the inter-relational and polyphonic aspects of lived experience.¹⁵⁶

Consequently, this practice-based research project produces new knowledge by engaging with CM pulse analysis and sound to both measure and comment upon being;¹⁵⁷ and at the same time, my using a premodern 'science of touch'¹⁵⁸ performs a contrasting approach to modern knowledge production (technology in the Heideggerian sense). This in turn activates reconsideration and reworking of the human/nature/technology relationship. In this way, the practice-based methods created for this project are able to comment upon *how* we measure the body and its being-in-the-world, whilst at the same time it searches for new and ethical ways in which to integrate knowing and being.¹⁵⁹ Thus, this project converges the Heideggerian enframing process together with Barad's ethico-onto-epistemology¹⁶⁰ in such a way as to adapt the clinic into an ethico-onto-epistemological tool that rethinks and reshapes the inter-relationships between 'knowing, being and valuing' (Barad, 2007, p.409). Within *Pulse Project's* performances, the frame of the clinic becomes a mechanics of *poesis*. It uses intuitive methods to bring forth the concealed knowledge of the body from an embodied and ethical position that measures the body by carefully listening to its rhythmic being-in-time – from a position of listening from deep within the confluences of knowing, being and caring in the world.

¹⁵⁶ This concept of bodies of sound as knowledge is discussed further in "*Pulse Project in Relation to Sound Studies*" in Chapter Five.

¹⁵⁷ This is accomplished by using human touch as a 'technology,' a method of measure that not only physically and psychically connects the researcher with research participants, but as touch is an interactive object itself, using touch as a method of measure can itself reveal a new approach to meaning-making by demonstrating the intra-activity that takes place both *within* and *in between* bodies of knowledge in the lifeworld. Conversely, relying on pure mechanical instrumentality to measure being is as Barad points out a method that separates knowing (epistemology) from being (ontology) and produces knowledge that re-enforces the split between humans, technological and natural phenomena, e.g., the nonhuman.

¹⁵⁸ See Hsu, 2000 for discussion of CM pulse analysis as a 'science of touch.'

¹⁵⁹ A more comprehensive discussion on the ways in which: a) artistic and techno-scientific methods are incorporated to produce knowledge of the relational body and b) the ways knowledge production of the body is performed within clinical encounter, can be both found in chapters three, four and five. Chapter Three outlines the 'frame' of the CM clinical encounter. Chapter Four outlines the practice-based interpretation of the CM clinic and how *Pulse Project* uses performance to produce new understandings the body. Lastly, the relationships between aesthetics, science and ethics are discussed in 'Transversal Relations and Ethico-Aesthetics' in Chapter Five.

¹⁶⁰ Barad acknowledges that onto-epistemology also involves ethics, because in producing knowledge from entangled relations, the knower must also carefully consider the conduct of how they produce and place their knowing within the time-space fabric of the entangled relations they are studying, i.e., the knower must consider the implications and consequences for how their knowledge production affects and effects all concerned (See Barad, 2007, p.90-91).

3. *Pulse Project:* The Chinese Medicine Encounter

Preface

Following on from the contextual discussions of embodiment and the technological frame of the clinic in the previous chapter, this chapter elaborates on the ways in which Chinese medicine (CM) incorporates artistic, spiritual,¹⁶¹ and technological methods into clinical practice¹⁶² to produce knowledge of the body. As the CM encounter constitutes the lifeworld context for the research questions of this thesis, this chapter examines the ecology of clinical relationships interconnecting the body with its environment, practitioners with medical participants and traditional¹⁶³ Chinese approaches to medicine with modern allopathic¹⁶⁴ approaches.

The Hegemony of the Clinic¹⁶⁵

Definitions

Since CM practice serves as the central methodological tool for interweaving art, science and technology (AST) practices into a new distinct transdisciplinary discourse in this thesis, before entering into the political complexity that practicing CM within the context of

¹⁶¹ By the term 'spiritual' I do not refer to the Judeo-Christian notion of spirit (and the dualism that the body/spirit relationship might imply), but the concept of spirit that is elaborated on in early Chinese medical manuscripts such as the *Su Wen* from the *Huang Di nei jing* (circa 250 BCE – please refer to Footnote 197 for a description of this text), which contains discussion of five spiritual phenomenal processes that are active both within the body *and* within the unfolding cosmos. As this manuscript is also a foundational medical text for CM, all treatment strategies thus address both the physical body and the spiritual and energetic phenomenal processes of the Five Spirits - *shén, hún, pò, zhì* and *yì*. This project only briefly discusses the *shén* and *yì* in the context of how these coherences function within the clinic, and in turn, how these clinical functions inform *Pulse Project* performances and soundscape compositions. For a detailed discussion on the processes of the *shén, hún, pò, zhì* and *yì* and their relationship with bodily and cosmic process, see the Glossary in Appendix I and also Larre and Rochat de la Vallée, 1995.

¹⁶² The clinical encounter I mention to here refer to practices and policies that take place within the UK, and more particularly, the practice of evidence-based medicine within the NHS.

¹⁶³ This term is somewhat misleading. Although CM situates its core theoretical approach to clinical practice from within and in relation to key texts from early Chinese civilisation – the trajectory of CM practice across time and national borders has produced a vast array of knowledge practices that are still in motion. This is the main reason I avoid the term TCM and chose CM as it is more reflective of the contemporary aspects of CM practice. See Scheid, 2002, p.3 for a contextual discussion of this issue.

¹⁶⁴ This is not to say that Western allopathic practices have a unity within themselves. As Mol, 2003, points out, the unity of Western medical practice is a trope that doesn't bear relation to its everyday practice. If one shifts the focus from what one knows (epistemology) to how they know (ontology), then the practice of allopathic medicine offers a wide variety of local, individual and contingent practices. Mol thus makes the point that medical practice is multiple. See Mol, 2003, pp.vi-viii.

¹⁶⁵ This concept is already an important topic of ethical discussion within the fields of biomedical research and clinical practice themselves. See Broderick, 2011, n.p.

conventional medicine raises, I open this section with a brief discussion of the terms 'traditional,' 'complementary,' 'alternative,' 'conventional' and 'integrated'¹⁶⁶ medicine to give a description of how CM is situated within the broad field of contemporary healthcare. Currently, CM¹⁶⁷ is defined as a 'traditional' medicine that is practiced as a contested but 'complementary' therapeutic intervention in relation to conventional medicine.¹⁶⁸

The World Health Organization (WHO) defines traditional medicine to be:

'the sum total of the knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health, as well as the prevention, diagnosis, improvement or treatment of physical and mental illness.' (WHO, 2005, p.xii)

Complementary medicine (which may include traditional medicine practices) refers to: 'a broad set of healthcare practices that are not part of a country's own tradition and are not integrated into the dominant healthcare system' (WHO, 2005, p.xii). Although complementary and alternative are terms that are used interchangeably (see WHO, 2005, p.xii), alternative medicine¹⁶⁹ signifies medical practices that lay outside of - and are an *alternative* to - conventional medicine practice. By contrast, complementary medicine exists alongside - as a *complement* to - conventional medicine. Conventional medicine can be defined as a highly specialized and technologically oriented practice that has its basis in Greek philosophy through Hippocrates. During its transition into the early twentieth century, it took on the characteristics of a rational, explanatory and materialist

¹⁶⁶ Each of the terms listed here are discourses in their own right, and literature on the politics related to these practices in the UK is likewise extensive. Therefore the scope of this discussion serves to provide only a very basic understanding of the politics and circumstances of practicing CM and acupuncture relative to orthodox medical practice (NHS) in the UK.

¹⁶⁷ CM is popularly referred to as 'Traditional Chinese Medicine' (TCM), which represents a knowledge practice that dates back at least 2000 years and includes practices such as herbal medicine, acupuncture, moxibustion (see Footnote 205 for a description of this practice), massage (tuina) and bone-setting. These practices contain spiritual, esoteric and theoretical components that place emphasis on preventative holistic healthcare, rather than on the 'medical model' that focuses on physical and technical causes for disease (see OECD, WHO and Eurostat, 2011, p.109; WHO, 2005, p.xiv).

¹⁶⁸ Although an initial report into role of complementary therapies within the NHS suggested positive findings in 2005 (see Smallwood, 2005, pp.17-18), and the National Institute for Healthcare Excellence (NICE) initially recommended complementary therapies such as acupuncture in 2009, by March of 2016, these recommendations were withdrawn due to insufficient evidence (see NICE, 2016, n.p.).

¹⁶⁹ Often the term alternative is used interchangeably with complementary, as they comprise the same set of practices, e.g., Chinese medicine, Massage, Homeopathy, Tibetan medicine, Ayurvedic medicine and Naturopathy. During my training (2002-2005) acupuncture students were encouraged to refer to CM practice as complementary and integrated - not alternative - as, at that time (2002-2005) we were trained to work with patients in collaboration with a team of healthcare professionals within the NHS (although the scope for acupuncture practice within the NHS has remained highly contested and is now very limited - see BAcC, 2016, n.p.). The university took this position to avoid the scenario where patients - knowingly or unknowingly - exclude themselves from the full benefit of conventional medicine and thus potentially pose serious risks to their own health.

model that 'aim[ed] to become more scientific... this medicine is socio-politically dominant in the Euro-American sphere' (Micozzi, 2014, p.42). Integrative medicine therefore represents a synthesis of medical practices by drawing on medical knowledge bases from both complementary and conventional medicine practices and convening them together into an integrated healthcare model¹⁷⁰ (see NCCIH, 2008, n.p.).

Clinical Experiences

As formative experience of working as an artist-acupuncturist within the framework of the biomedical clinic constitutes the lifeworld context for the investigations of this project, this section forms an account of my direct experience of the complicated circumstances surrounding medical interventions within a clinical setting.

The multiplicity of practices and interactions that combine to form the content of a course of CM treatment (this also includes patients' participatory experiences) is sharply contrasted by the reductive approach taken by regulatory bodies such as NICE (National Institute for Healthcare Excellence), who aim to standardise¹⁷¹ clinical practice by basing their governance on evidence-based medicine protocol (EBM). EBM can be briefly summarised as a framework of tightly drawn criteria for assessing medical practices and outcomes – criteria that, based on my professional experience, often excludes any analysis of, or indeed any inclusion of, the personal experiences, narratives and environmental contexts of its study participants.¹⁷²

It was precisely my experience of an incommensurate gap between the complexity of

¹⁷⁰ The integrative medical system represents the model I was educated within. Integrative medicine has been a feature of NHS Primary Health Care Trusts (PCT) circa 2000, where acupuncturists and other complementary therapists could work as part of an integrated healthcare team at PCT/GP surgeries. However, recent unfavorable random control trial results and maintenance cost-related issues have meant that these services are being contested and restricted (see Adams, 2013, pp.191-194; BAaC, 2016, n.p.).

¹⁷¹ The scope of standardization of practice covers North America and Europe predominantly (see Micozzi, 2014, p.42).

¹⁷² For example, the main method used to assess clinical efficacy in EBM is the randomized control trial (RCT). The designs of these trials aim to present a 'hierarchy of evidence' (Akobeng, 2005, p.840) that allows for the economic evaluation of which interventions 'should be given the most weight' (Akobeng, 2005, p.840). Clinical effectiveness in RCT studies focuses on the intended performance (the hypothesis) of the interventions themselves, e.g., drugs, as relative to the 'compliance' of patients to take the course of treatment as prescribed. Therefore, patient compliance or non-compliance is a major determining factor of efficacy in RCT literature (see Davies and Kermani, 2012, pp.1-3). But here again, the complexity of the patient's experience in the clinical encounter is quantitatively couched in terms of patient compliance or adherence – the *fact* of whether they act as directed to - rather than include or describe the *quality* of patients' participation within the medical encounter. The placing the burden of proof of efficacy upon patients themselves (by counting upon their compliance and outward response to treatments), yet without in some cases fully making participants aware of certain aspects or procedures occurring within the study (which constitutes a lack of consent), nor being responsive to patient/participant experiences... these issues are the subject of considerable ethical debate within current medical research (see Nardidni, 2014, n.p.).

working with people's bodies within clinical practice on the one hand, and fitting this complex experience into the narrow confines of EBM's 'golden standards'¹⁷³ for evaluating effectivity in clinical practice on the other, that first raised my awareness of EBM's limited capacity for faithfully capturing the sensorial, inter-relational and embodied aspects of healing (effectivity) within the clinical encounter (see also Plsek and Greenhalgh, 2001, pp.625 - 628; Farquhar and Zhang, 2012, p.11; Spense, 2014, g.22; Scheid, 2002, p.2). It is my experience of this epistemology/practice dilemma within the CM clinic described above that provided the basis for this project's research questions and concerns. This dilemma also inspired me to question whether artistic research methods could - by offering a contrasting perspective on how to conduct diagnostic processes - generate a new dialectic within the medical knowledge-making encounter and thereby produce new forms of healing-knowledge.¹⁷⁴

In this way, the primary problem of this thesis, that of using artistic research to query the body's relationship to technology, science and society arose from my experience of the hegemony of the clinic.¹⁷⁵ Because CM does not easily conform to the design of EBM and biomedical practice models, consequently, its significances are often positioned as marginal to the significances of biomedical knowledge. Furthermore, CM's lack of compliance often results in persistent claims of doubt as to its clinical effectiveness by EBM and medical professionals who adhere to the sentiment that the biomedical paradigm represents the 'one, reality, one truth' (Hacking, 1996, p.44). The result of this situation is that sustainability of CM practice remains uncertain.¹⁷⁶

Debates

Assessing the efficacy of medical practices existing outside EBM's North American/Eurocentric code of standards remains a challenging task. One of the significant contributing factors for this difficulty is that EBM clinical controls tend to be slanted in

¹⁷³ See Ledger 2010, 'The gold-standard of management? Evidence-based management and healthcare delivery' for further discussion on the policies and best practices of EBM.

¹⁷⁴ Healing, in this context and throughout this thesis, refers to co-produced transformative aspect of knowledge production, i.e., knowledge produced between practitioner and querent, and, between two medical systems.

¹⁷⁵ See Cant and Sharma, 2004, pp.13-14 for discussion of how biomedicine as an institution subjugates medical practices outside the biomedical paradigm as 'alternative' thereby conferring upon them a marginal positionality. For discussion of how the body is still assessed according to the logic of the body as a 'functional machine' within the narratives of medical positivism see Gillet, 2004, pp.45-47. See also Hacking (1996, p.44) for discussion of scientific monism that exists within a broad range of scientific communities (including clinical medicine).

¹⁷⁶ This is not only the case in the UK and other Western countries, but is actually a growing concern in China. See Nie, 2013, p.182 for discussion regarding concerns of how globalization of Western hegemony is currently having a negative impact on traditional Chinese practices such as TCM in China to such a degree that traditional Chinese medical ethics are losing their social significance altogether.

favour of their own internal logic-system.¹⁷⁷ For example, the actuality that almost all of my patients/clients' health vastly improved through the activation of their own body's innate healing processes¹⁷⁸ – to such a degree that I was able to assist many to come off their medications (much to the surprise of their GPs¹⁷⁹) – these positive clinical results are not acknowledged as significant because they have been brought about by methods and responses that greatly diverge from the standards and methodological frameworks (logic) of EBM and allopathic medicine. Thus the healing responses that have been co-produced in my clinic are often referred to as a *placebo-effect*.¹⁸⁰

This term usually refers either to a healing response that exists outside of the logic of allopathic medicine, or it refers to the administering of a 'fake' medicine to medical study participants as a method for testing the effectiveness and significance of a medical intervention.¹⁸¹ Kaptchuck writes that the placebo effect (in the clinical context) therefore raises questions of 'clinical and scientific value' (Kaptchuck, 2002, p.67) as well as 'ethical questions about what is "legitimate" healing' (p.67). He further asks: 'What should decide appropriate healing, a patient's improvement from his or her own baseline (clinical significance) or relative improvement compared with a placebo (fastidious efficacy)?' (p.67). Though there are many situations where allopathic intervention might be the best choice, a more subtle investigation of the causal interplay between a person's malady and the body's healing processes can reveal an ambiguity as to whether one form of medical response is more appropriate (effective) than another.

For example, Moerman (2002) discusses this ambiguity in the following statement: 'By

¹⁷⁷ For further discussion on the ways in which EBM designs favour a North American and Eurocentric model of medical science, see: Farquhar and Zhang, 2012, p.11; Scheid, 2002, p.2; Latour, 1999, p.58.

¹⁷⁸ The description for how the body's innate healing mechanisms are activated is described in greater detail in the sections titled: 'The Intercultural and Interpersonal Encounters with Medicine' and 'The Body Ecologic' in this chapter.

¹⁷⁹ This was of course achieved with the co-operative supervision of each client's GP.

¹⁸⁰ According to psychiatrist A.K. Shapiro, the placebo effect is defined as 'the changes produced by placebos' (Shapiro, 1964, p.136). Refer to the Glossary in Appendix I for the definition of 'placebo.'

¹⁸¹ For instance, the NHS gives the following definition of a placebo: 'For hundreds of years, doctors have known that when a patient with a health condition expects their symptoms to improve, they often do improve...This kind of fake or empty medicine is often called a "placebo", and the improvement this causes is called the "placebo effect".' (NHS, 2016, n.p.) The NHS then suggests a connection between this fake medicine and its effect with complementary medicine by stating: 'It's important to be aware of the placebo effect when choosing complementary and alternative medicines (CAMs). If you choose a complementary or alternative treatment that does not work – and only causes a placebo effect – you may miss out on more effective treatments.' (NHS, 2016, n.p.) Without going into detail, I mention this here to demonstrate my point of a hegemonic rationale in the NHS/biomedicine clinic; one type of medicine will cause a 'true' effect, and the other a 'fake' effect. There is also significant disregard for the role the human body itself might play within the act of healing – the medical intervention is the only factor in RCT studies that truly 'counts.'

contrast, there is ample evidence to indicate that nature, character, personality, behaviour, and style of doctors can influence a good deal of human response not only to inert [placebos] but also to active medication' (Moerman, 2002, p.41). Additionally, the confidence of the healer in their ability to heal the patient as well as the relationship between healer and patient also play significant roles in determining the healing response – or what Moerman refers to as 'the meaning response' (Moerman, 2002, p.8). For this reason, I argue that having the ability to choose from a diverse range of medical practices and treatments remains an important factor in a person's production of their own healing.

Nonetheless, in the UK, central institutions such as NICE and the NHS continue to discourage people from accessing medical practices that diverge from the EBM 'gold-standard'.¹⁸² Moreover, given some of the shortcomings of RCT study designs¹⁸³ and also the ethical controversies surrounding the hegemony of the clinic raised thus far, I have yet to see significant public conversation about the efficacy of biomedicine as an intervention... a conversation that treats biomedical interventions as a choice – rather than as the only choice – so that the public can become better informed about how many deaths and disease such interventions potentially cause. Of course CM also poses certain risks and can precipitate adverse effects,¹⁸⁴ however these adverse events are relatively minor when compared with the toxicity of pharmaceutical drugs and other biomedical interventions (see Scheid, 2002, p.271 and Millburn, 2004, p.6). The statistics of (biomedical) iatrogenic disease can be shocking and are not common knowledge, as Bunker reports:

'A year 2000 report by the Institute of Medicine in Washington estimates that "adverse events" occurring in the course of treatment, one-third to two-thirds of which could be attributed to medical error, are responsible for between 44000 and 98000 deaths annually in America.' (Bunker, 2001, p.1261)

Consequently, the politics surrounding what appears to be 'effective' and also what

¹⁸² For example, recently NICE has rescinded their recommendations for doctors to prescribe acupuncture for low back pain due to a lack of compelling consistent evidence. This volte-face refers to a recent review of RCTs that researched the effectiveness of acupuncture studies and found that acupuncture treatments were no more than a placebo ('sham' acupuncture was assessed to work just as well as the 'real' acupuncture), although there remains debate as to how these studies have been conducted and analysed in the first place. See Davis, 2016, n.p. and NICE, 2016.

¹⁸³ See also Paterson and Dieppe, 2005, where the authors discuss their findings on the limitations for measuring the efficacy of Chinese medicine and acupuncture in RCTs. The authors list the significant shortcomings of RCTs to be: 'a) biomedical diagnostic procedures are the standard model for RCT designs, b) the therapeutic relationship "effect" is separated from the "efficacy" of the characteristic effects of drug interventions, and so on, c) incidental and subtle medical effects, which are intertwined with characteristic/quantitative effects within Chinese medical interventions, are classified as "additional" and therefore considered only supplemental to the significant findings of RCT studies, d) testing "false" [sham] acupuncture points as a "control" in an randomised control trial may lead to misleading results' (Paterson and Dieppe, 2005, p.1203-1205).

¹⁸⁴ See Ko, 2004, p.110, for discussion listing common adverse effects and deaths caused by CM interventions.

constitute legitimate and illegitimate forms of medical intervention and healing are not as straightforward as they may superficially appear. Thus to investigate the central research themes and dilemmas of this thesis, *Pulse Project's* performances adapt CM clinical practice into a research tool that engages with diverse audiences across art, medicine and technology research fields¹⁸⁵ through staging participatory events that aim to widen public awareness of and raise debate about the concerns mentioned in this section.

***Pulse Project* and Cross-Cultural Discourse**

When presenting my research on clinical experience as an acupuncturist within the contexts of science or arts practice themed conferences in Europe and the UK, common responses have been that CM is a pseudoscience or is new age. However, when presenting the same research in Shanghai, there was a marked interest from Chinese academics in how CM was being integrated with Euro-American artistic research (although this is not to say there were not ambivalences and hidden complexities to some responses to my research).¹⁸⁶ Whilst referring to CM as a pseudoscience may be considered within the range of acceptable criticism within a European context, within a Chinese context, the charge of pseudoscience was more contestable. Thus, discrediting the scientific credentials and import of a traditional Chinese science in UK/European contexts is not simply a matter of assessing its effectivity, but beneath the assertion of such claims lay the persistence of colonialist thinking about non-Western science

¹⁸⁵ As mentioned in the 'Dissemination of Research' in the Introduction, this project has been presented at numerous cross-disciplinary venues such as 'Leonardo Art and Science Evening Rendezvous' (LASER) at Central Saint Martins, London and 'Consciousness Reframed' at Roy Ascott Studios, Detao Masters Academy in Shanghai, China, to name just two examples. For a comprehensive list of the public talks about and/or performances of *Pulse Project*, refer to the Research Outputs in Appendix III.

¹⁸⁶ The circumstances of discussing Chinese/Western histories within the context of contemporary Shanghai is far more complex than can be conveyed in this brief section. For example, during one of my workshops in Shanghai, whilst Chinese students (all approximately twenty years old) were initially dismissive of CM – with one student telling me that the Chinese Communist Party (CCP) says that practices like CM are dragging the country backwards. These students were at the same time unanimously and intensely interested in learning more about CM and engaging with what traditional and contemporary knowledges might generate. This ambivalence exhibited by the students serves as a reflection of the history of CM practice itself in its progression from pre-industrial China through to the present. To give one account, Mao Zedong worked to advance CM as an important national treasure during the formation of the CCP (but as a medicine that required modernization), whereas modernizers within the CCP's Ministry of Health later aimed to discontinue its practice altogether and leave it behind with China's imperial past. This situation is further compounded by the psychological internalization (within Chinese nationals) of European dominance over Chinese industries and interests whereby Chinese natives reject their own trajectory of cultural progression and knowledge technologies in favor of the knowledge systems and traditions of the colonialist. See Scheid, 2002, pp.65-107 and Luesink, 2015, pp.160-179.

practices (See Said, 1978, pp.6-7; Luesink, 2015, pp.160-179). By labelling CM a pseudoscience within this context, this action re-institutes a Eurocentric intellectual dominance by positioning the Western (modern) model of science practice as superior to the Chinese (traditional) model. Subsequently, this section gives a brief outline of significant cross-cultural and postcolonial discourses¹⁸⁷ that align with the personal experiences and hegemonic politics described thus far in this chapter.

Significant literature that addresses the existence of hegemonic relations between Euro-American and Asian cultures relevant to mention here are:

- Barlow (1997) *Formations of Colonial Modernity in East Asia* - addresses the indivisibility between modernity and colonialism.
- Said (1978) *Orientalism* (considered a central text on this topic) - discusses the long-term subjugation of Eastern cultures by the West through their establishing a positional superiority (both culturally and economically) over Eastern 'others' and thereby imposing upon them a 'battery of desires, repressions, investments and projections' (Said, 1978, p.8).
- Nie (2013) *Medical Ethics in China* - conducts a cross-cultural analysis of key bio-ethical issues arising from historical and contemporary relationships and practices of Western and Chinese medicines (this discussion is contextualised within a contemporary Chinese socio-political context).
- Spivak (1999) *A Critique of Postcolonial Reason* - performs an analysis of Western philosophy, literature, history and culture to give voice to the 'subaltern' or oppressed by describing the myriad ways the West destroys non-Western customs and practices and refuses non-Westerners full human status.
- Gregory (2004) *The Colonial Present* - addresses how the effects of colonial power are still being enacted in contemporary global society.
- Choi (2010) *East and West, Understanding the Rise of China* - addresses the implications the ascendancy of China proposes for the West and its stronghold on cultural dominance.

These texts thus outline the trajectory of postcolonial discourse relevant to the intercultural conversation and critical positioning of this project.

Therefore, to travel transversely from the hegemony of (Western) biomedical science's authorisation of CM towards a more open discussion of the value of CM practice, this study investigates CM's potential relevance to contemporary art and medicine practices by using CM as an artistic research method that questions the epistemological

¹⁸⁷ Postcolonial discourse for the purposes of this discussion refers only to texts and commentary that specifically address East-West relations.

foundations of modern science and technology – and also to uncover colonialist legacies within mainstream contemporary culture.

As Dissanayake (1993) points out, the philosophy of CM provides ‘a historical perspective to the relationship between body and society that is conspicuously absent in phenomenologically oriented Western social theory’ (Dissanayake, 1993, p. 33). Thus, in addition to the logic and ethos of CM presenting a challenge to Western science and technology epistemologies, CM also challenges the notion of the body as defined by Western modernity because CM practice involves the maintenance of *traditional* knowledge practices as integral to informing contemporary (medical) knowledge of the body. Moreover, CM is not strictly a ‘traditional’¹⁸⁸ medicine as CM research maintains an intense commitment to exploring contemporary allopathic approaches and techniques and integrates this knowledge into CM praxis.¹⁸⁹

I therefore argue that the CM approach to apprehending the nature and architecture of the human body offers an important contribution to contemporary medical practice - not only because it can innovate aspects of clinical practice towards developing a more creative healing encounter for patients and doctors alike, but also because it offers cross-disciplinary and intercultural readings of the body-politic of the clinic.

The Body-Politic of the Medical Gaze¹⁹⁰

In his landmark critique of the modern clinic, Michel Foucault identifies the function of the ‘medical gaze’ as a clinical device which privileges sight over other senses, and thus positions the observer in a superior and objectifying position over the body of the other (patient). In *The Birth of the Clinic* (1973), Foucault argues that within the sight/touch/hearing ‘sensorial triangulation’ of ‘anatomo-clinical perception,’ medical significance ‘remains under the dominant sign of the “visible”’ (Foucault, 1973, p.165) and

¹⁸⁸ As I mention in the Preface to this thesis, I refer to the practice of Chinese medicine as ‘CM’ rather than Traditional Chinese Medicine (TCM) to allow room for interpretation and understanding of the contemporary aspects of Chinese medicine and to differentiate it from the restrictive post-Maoist definition of Chinese medicine (TCM).

¹⁸⁹ For example, current CM research in China is contributing innovations to both (traditional) CM and biomedicine fields. China (currently) takes a more open-minded approach in researching how CM and biomedicine might work together, and whether these results might produce new significances for clinical practice. For a few examples see: Makris, et al., 2009, the Chinese Journal of Integrative Medicine (Springer, 2016, n.p.) and The Art and Science of Traditional Chinese Medicine (2014).

¹⁹⁰ This section comprises text from an article that has been published prior to this thesis and has subsequently been rewritten and re-contextualised for this section. See the original text in Appendix II, page 242.

that the diagnostic relationship is constructed and authorised by the 'triumph of the gaze that is represented by the autopsy: the ear and the hand are merely temporary' (p.165). What is crucial in Foucault's analysis in terms of this study is that the epistemological foundations of modern clinical diagnosis and prognostication find their basis of origin in the autopsies of the Enlightenment and also in Descartes's conception of the body as an assembly of mechanical processes.¹⁹¹ From this point onwards, the dynamics of the 'anatomy lesson' of the autopsy (see Figure 4) continues to shape the power relationship between doctor and patient as well as the scope of clinical inquiry, i.e., the development of medical diagnostics and interventions as methods for securing a rational and visual vantage over the body's pathological processes and death (see Foucault 1973, p.167).



Figure 4: *The Anatomy Lesson of Dr Nicolaes Tulp* (1632). Rembrandt van Rijn. Oil Painting on Canvas. Public Domain Attribution. Source: Wikimedia Commons.

¹⁹¹ Descartes believed animal and human bodies to be automated – that bodies are essentially complex machines. Moreover, Descartes does not make much categorical differentiation between the living and the dead. Animal bodies were insensate automatons whereas human automatons possessed both a will and a 'rational soul.' The rational soul is separate from, but connected to the body. See: Descartes, 1988 [circa 1648], particularly XI, Nos. 6-44. This ideology strongly influences the mind-body paradigm that can be found in many branches of Western thought - a politic that is discussed in the section entitled 'Intersectional Embodiment' in Chapter Two.

Furthermore, Foucault contends that auscultation of the patient itself was developed under the auspices of the medical gaze, by remarking that: 'the medical gaze is now endowed with a plurisensorial structure... that touches, hears and... sees' (Foucault, 1973, p.164). What Foucault refers to here is the instrumentality of vision within the clinic. Even auscultation is a form of gaze-as-listening. This is because the development of medical instruments, particularly the stethoscope, has been constructed under the rationale of looking rather than feeling.¹⁹²

During my own clinical training I was taught to regard the body of others (patients) from the perspectives of two medical rubrics simultaneously. One mode of experience was directed by the biomedical model, where the patient is assessed from a certain professional distance and is placed in relation to a lexicon of pathological conditions; the other mode of experience was informed by the CM model, where the clinical relationship between the practitioner and the patient (whom I call 'querent') is less 'clear-cut' and more inter-subjective. For example, the acupuncturist actively feels for imperceptible qualities within the querent's pulse, palpates the skin viscera by touching local sites along the channels, points and organs, asks questions about the querent's condition and emotional state, listens for certain sounds within the voice and body, uses one's sense of smell to detect significant odours, visually observing subtleties such as pallor, the shine in querent's eyes and so on. Overall, when compared with the allopathic model, tactility features as the primary mode of relating, diagnosing and healing in the clinic of the CM physician (see Hsu, 2005, p.120).

This divergence in approach to apprehending the nature of the body between allopathic and CM approaches can be traced back to early civilisation.¹⁹³ Chinese Anthropology scholar Elisabeth Hsu writes: 'Unlike the Greek philosophers Plato and Aristotle, who distrusted the tangible material world, and spoke of "purposeful instruments" (i.e., the imputed mindful purpose to the instruments they described [technology]), Chinese physicians seemed to have an unbroken relationship to matter' (Hsu, 2007, p.120). Therefore, within the trajectories of European and Chinese medical cultures, the manifestation of the technical also travelled in different directions. On the one hand, allopathic physicians relayed the concept of the body as an individual organism, separate

¹⁹² Here I refer to the formation of a mechanical objectivity that connects seeing with establishing facts whilst at the same time creating a sense of distance from the subject (see Daston and Galison, 1992, pp.83-84) - rather than relying on the immersive perceptive senses of hearing and feeling (palpation).

¹⁹³ For a comparative analysis of Chinese and Western medical approaches to the body, see C. Matuk, 2006, pp.1-8, which provides a succinct illustrated historical analysis on how medical knowledge was developed in the West via adopting dissection as the central means of investigation of the body (due to interest in the muscular and physical aspects of experience) and how in China metaphor was used (due to interest in the agricultural aspect of experience) as a central device with which to build knowledge of the body in relational and cosmological terms.

and distinct from the exterior world and elaborated upon the processes of the body as discrete system of mechanical processes. Conversely, Chinese physicians approached the body as an ecological organism that shared a complex relationality with the environment and with the wider cosmos – as a systemic of interior and exterior interrelated and alchemical processes (see Hsu, 2010, p.15). (See Figure 5)

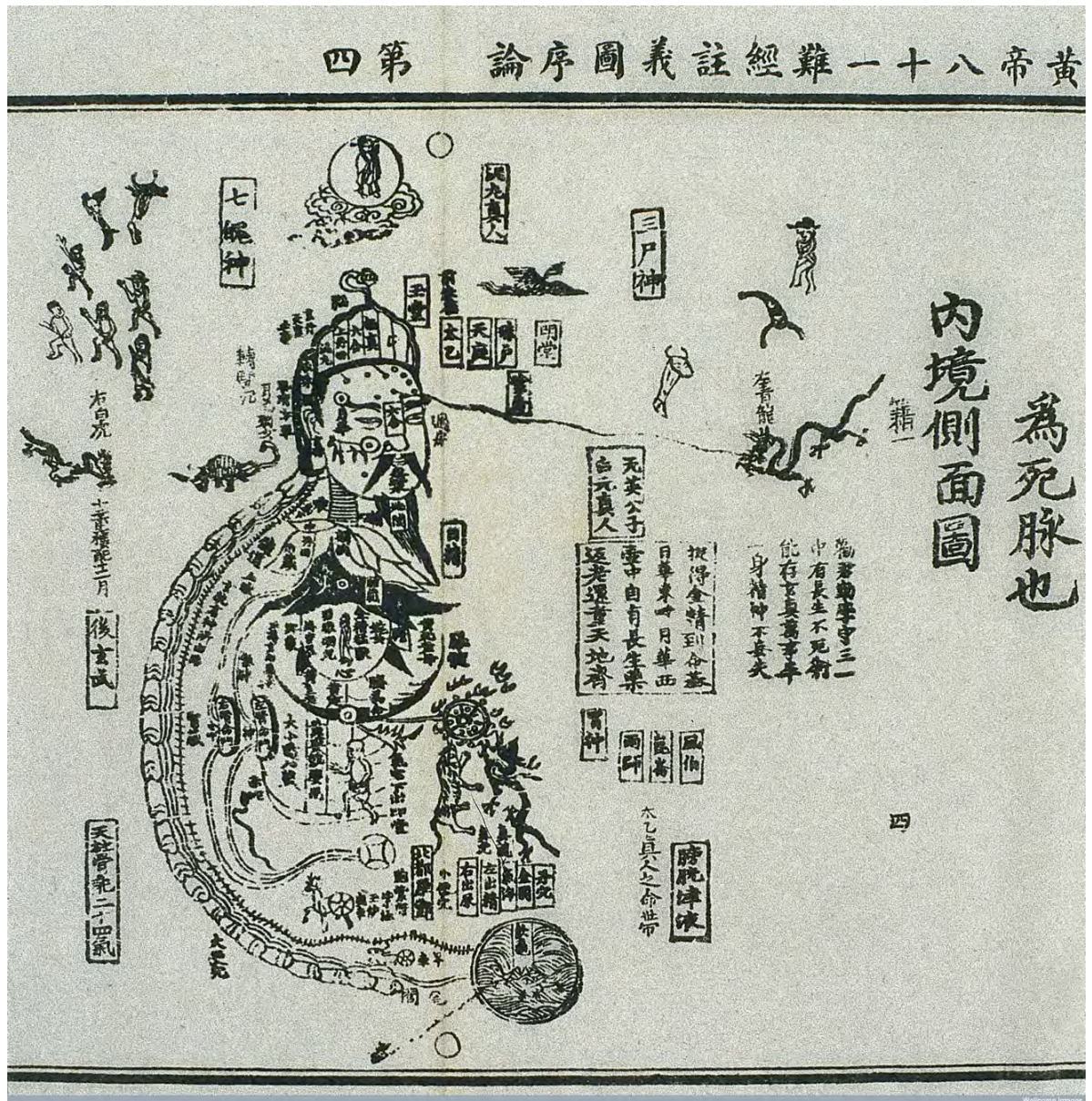


Figure 5: *Neijing Tu* (1436-1443). Li Jiong. [Woodcut]. Creative Commons Attribution. Source: Image Courtesy of the Wellcome Trust Library.¹⁹⁴

¹⁹⁴ This image shows the inner landscape of the body as a microcosm of the natural world according to the *Huang Di ba shi yi nei jing zuan tu jujie* (The Inner Canon of the Yellow Emperor: Eighty-One Problems - second century BCE). Notably, the body is depicted as 'open' to the exterior, as an assembly of parts that are at once distinct and also part of the exterior environment.

On Clinical Auscultation and Diagnostics¹⁹⁵

This section generates a comparative discussion on the divergent clinical approaches to auscultation practiced by CM and allopathic physicians and what these divergences might signify.

As briefly mentioned in the previous section, the dynamic of the medical gaze informs the manner in which instruments are designed and implemented within the (Western) modern clinic. Sound studies scholar Jonathan Sterne remarks that, 'until the discovery of x-rays at the end of the 19th century, auscultation was the only available method for approaching the interiority of patients' bodies without physically cutting them up' (Sterne, 2003, p.123). Sterne further contends (in agreement with Foucault and Stanley Reiser), that the stethoscope allowed the physician to perform a sonic autopsy on patients whilst they were still alive (see Reiser, 1981, p.36). This approach to listening to patients is 'a strategy that makes sense only given the status of the autopsy in the acquisition of medical knowledge: while dead patients lay forever muted, their bodies could yield up immutable truth through the empiricist's skilful use of the scalpel. The body of the patient was a whole network of anatomo-pathological mappings' (Sterne, 2003, p.124).

Foucault considered the stethoscope an instrument of hegemonic relationality in the clinic as it was used to materialise a 'solidified distance' (Foucault, 1973, p.164) between doctor and patient. Sterne (2003) expands upon this theme by suggesting that the stethoscope introduced a modernity into the consultation that afforded the physician a position of purity and autonomy from the patient by writing: 'the physicians' withdrawal from such person-centred signs of illness was increased by the fact that the auscultation process required the physician to isolate himself in a world of sounds inaudible to the patient' (Sterne, 2003, p.123). This facilitated the physician's reliance on methods that could 'yield data independent from the opinions and appearance of the patient' (2003, p.123). Subsequently, listening to others in the clinic became a form of listening that conforms to the 'rules of method' (Latour, 1987, p.17). That is to say, the data, and the method of extracting data from the patient by the physician became more clinically 'significant' than the patient's account of their personal (subjective) experience.

From the perspective of the early Chinese practice of auscultation, Hsu writes (2005):

'If visual inspection of corpses was central to the development of anatomy in modern Europe, one may ask which of the senses was important for the emergence of the predominant currents of scholarly medical knowledge and practice in third and second century B.C.E. China? ... it was tactile perception

¹⁹⁵ This section comprises text from an article that has been published prior to this thesis and has subsequently been rewritten and re-contextualised for this section. See the original text in Appendix II, pages 242-243.

prompted by a tactile exploration of living bodies.’ (Hsu, 2005, p.7)

Based on her interpretations of the *Mǎwángduī Medical Manuscripts*¹⁹⁶ and the *Huángdì Nèijīng*¹⁹⁷ (two medical texts from the second century BCE), Hsu (2005) finds it intriguing that ‘Chinese physicians of early dynastic times became interested in subtle changes that are not directly visible to the onlooker’ (Hsu, 2005, p.12), and subsequently asks, ‘How can we explain their scientific interest in subtle, often invisible changes?’ (p.12).

Hsu’s investigations of diagnostic tactility in the *Mǎwángduī Medical Manuscripts*, particularly of texts that list both active *investigative* and passive *perceptive* methods of touch (see Hsu, 2005, pp.19-21), give testimony to the manner in which early Chinese physicians were interested in the subtle, imperceptible and temporal as significant subjects of scientific inquiry. These texts, and similar artefacts (see Figure 6), make clear how human touch was used as the central instrument for discerning the way the energetic oscillations of each organ-vessel should ideally express themselves – though using touch as a sensible and *feeling* technology. Early Chinese physicians thus created a scientific form of touch that was/is able to interact with and understand the processes of the *living* body. For this reason, Hsu (2005) concludes that the tactile approach Chinese physicians adopted in discerning human wellbeing made them more sensitive to the affective, inter-relational, subtle and somatic/bio-dynamic aspects of human experience than occidental medicine (see Hsu, 2005, p.28).

¹⁹⁶ These manuscripts, found at the *Mǎwángduī* burial site at around 221 BCE, demonstrate a somewhat primitive level of medical development as they refer mainly to theoretical advancement of *yīnyáng wǔxíng* theories - but very little development of the channels and organs or *zàng-fǔ* (see the Glossary in Appendix I for the definition of these terms). See Harper, 1998, pp.10-13.

¹⁹⁷ The *Huángdì Nèijīng* or *The Yellow Emperor’s Inner Canon Classic* is a text dating back to approximately 320 BCE, but consensus differs on this date (see Lu and Needham, 1980, p.xxix; Sivin, 1993, p.199; Unschuld, 2003, pp.1-3). The *Huángdì Nèijīng* is referred to as the most significant text in the history of Chinese medicine. It was compiled over a five hundred year period by various anonymous authors and was later translated and formatted into various versions up until at least 725 CE (see Unschuld, 2003, pp.40-44). The book itself is divided into two parts, the *Suwen* and the *Lingshu*. The *Suwen* comprises nine volumes (chapters one to fifty-nine) and the *Lingshu* comprises the other nine volumes (chapters sixty to eighty-one). Together they make up eighty-one ‘difficult issues’ that refer to questions concerning the cultivation of health and the moral, spiritual, physical and environmental causes for disease. These questions are in the form of a dialogue between *Huángdì* (the Yellow Emperor) and ministers or scholar-physicians - the main character is scholar-physician *Qíbó*. The *Suwen* describes the medical philosophy of the inner and outer alchemical operations of *yīnyáng*, *wǔxíng* and the physiology of the *zàng-fǔ* organ-channel network (see the section ‘The Body Ecologic’ in this chapter for further discussion and illustration of these concepts). The *Língshū* describes particular pathologies in relation to acupuncture points and needling techniques (see Unschuld, 2003, pp.6-8).

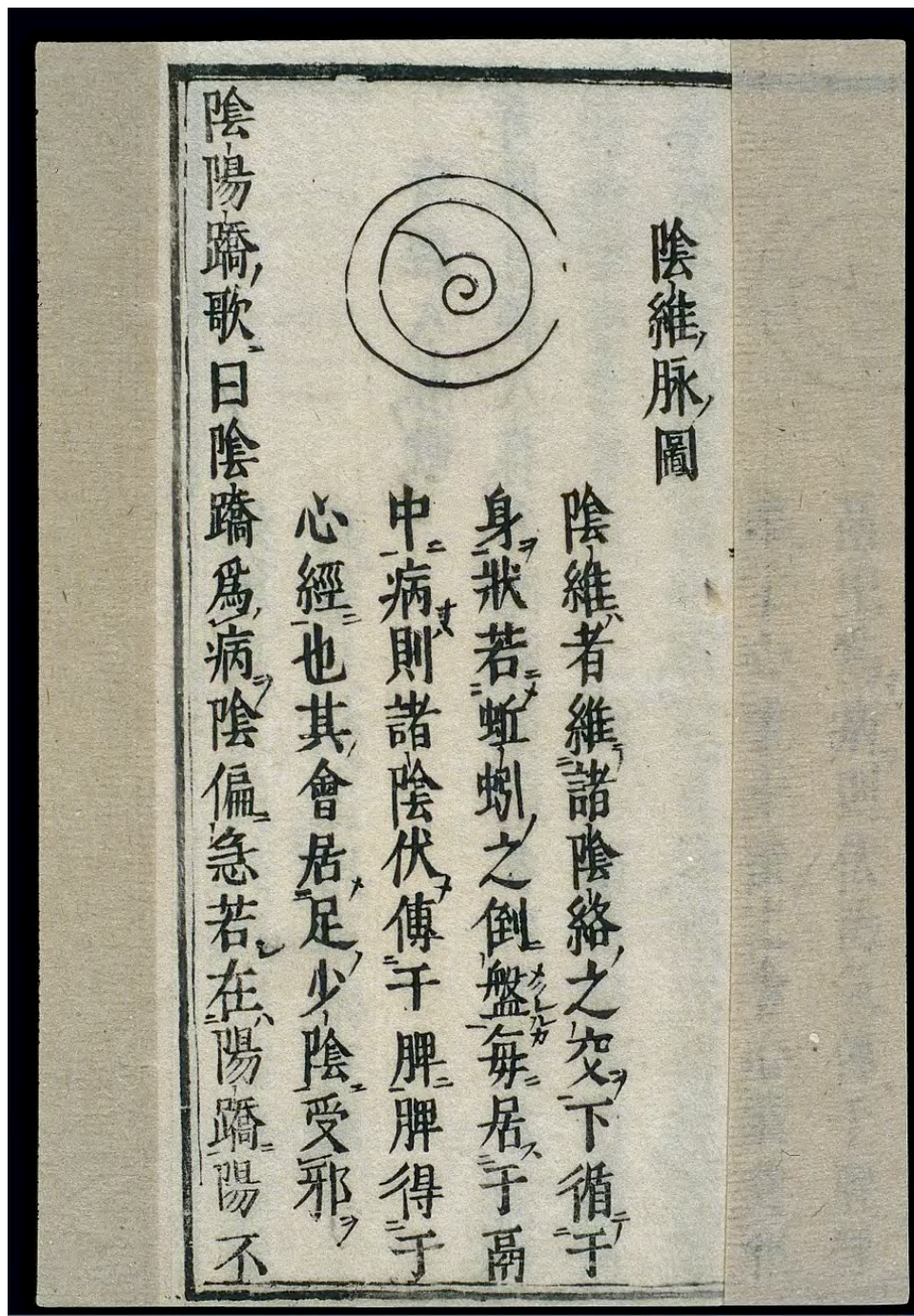


Figure 6: Yin Weimai Pulse Image. (180-270 CE) Attributed to Wang Shuhe and edited and revised by Shen Jifen (1368-1644). [Woodcut] Creative Commons Attribution. Source: Image Courtesy of the Wellcome Trust Library.¹⁹⁸

¹⁹⁸ This woodcut shows a pulse image (the round circle is the artery and the line inside the circle is the pulse wave-form) from the *Renyuan maiying guizhi tushuo* (Pictorial Handbook of Pulse Images Based on the Person), a text from third century physician Shuhe that was edited and revised by Shen Jifen during the Ming period (1368-1644). This image is one of forty-eight pulse image diagrams that discuss the pulse impressions of medical conditions in explicit detail. This text states: 'The *yin weimai* connects with the *yin* channels and collaterals and descends along the body. Its pulse image is like a worm wriggling backwards and this relates to illnesses related to Yin Link Channel, which are: heart pain, melancholia, etcetera' (Wellcome Trust, 2015a) I use this image as an example of the detailed notations created by early Chinese physicians that forms a source of inspiration for this research.

Consequently, this project positions itself in alliance with Foucault's and Hsu's critique of the (Western) modern medical gaze and responds to their concerns by using premodern medical touch, sound and interactive social encounters as transdisciplinary research methods that enable a critical examination of the modern medical gaze and auscultation processes of the clinic. By using both ethical and affective¹⁹⁹ modes of investigation to engage with research participants, this project generates both new understanding about listening to others (auscultation) and also provides a critical reflection on the performance of medicine by using participant feedback to create a process for reflective analysis.²⁰⁰ Thus the participatory research of this project enables an ethical 'listening' to the ways auscultation can be conducted in the clinic.

Furthermore, this research generates cross-directional disciplinary knowledge communication between artistic and medical practices. For example, my medical experience is used to inform the conceptual approaches to conducting artistic research, such as repurposing the clinical auscultation process into performance and sound art practices. The performance and sound art practices (as new auscultation methodologies) then create new interpretations (knowledge) of the imperceptible bioprocesses of the relational body. This knowledge is then fed back into my clinical practice. This cross-directional development of artistic and medical knowledge can also inform clinical practice more generally by providing new transdisciplinary techniques for listening to the inner lives of others in the clinic.²⁰¹

Intercultural and Interpersonal Encounters with Medicine

Through daily experience of practicing acupuncture, particularly as the clinical encounter is co-performative,²⁰² I began to regard the body-in-being and the materiality of the

¹⁹⁹ Feeling here refers to affect, to the particular way touch as a diagnostic instrument cares for the medical body, i.e., using human perceptive faculties to read the phenomenology of human emergence. In this way, affective feeling is differentiated from, but is not divided from affection and emotionality, especially since the Chinese regard the emotions as an integral part of the body's phenomenological processing of the cosmic. See Wu and Fang, 2013, pp.272, 295.

²⁰⁰ See the section titled 'Participant Engagement and Feedback' in Chapter Four for further elaboration on the participatory and ethical research methods used in this project.

²⁰¹ This cross-directional knowledge production was previously discussed on pages 24-27 and is also discussed again on page 82 and in the Conclusion.

²⁰² Co-performative is used here to demonstrate how this project's performances and participatory research enables the co-production of meaning through performative and communicative processes that are active between researcher and participants, rather than from producing informational knowledge from the point of view of a singular observer (and thus participating in a hegemonic form of knowledge production). See Conquergood, 1991, pp.187-188.

energetic interrelationship between practitioner and participant themselves as artistic mediums. In engaging in investigations (both verbally and physically) into the indeterminate and contested spaces between oneself and another, between medical knowledge systems and between artistic and scientific methodological practices, my clinical practice has become a transdisciplinary and transcultural space of inter-performativity and collaborative meaning-making.

The Clinical Encounter: A Case Study²⁰³

This section offers an account of a typical acupuncture clinic encounter to give an example of the thoughts, experiences and perspectives that are characteristic of this unique clinical situation. At the same time, this section also provides a point of reference for how the intimate, diagnostic and prescriptive aspects of the CM encounter have been adapted and incorporated into *Pulse Project's* performances, notations and soundscapes.

S²⁰⁴ has been consulting with her GP for several years about her dysmenorrhoea (painful periods), high blood pressure and excessively cold hands and feet and has come to my clinic for several months in search of another approach. S sits next to me and I ask her questions about her experiences since I last saw her, e.g., what feels better and what needs focusing on. I listen carefully to the events, impressions and situations she wants me to pay attention to as she speaks about her week. I not only look for signs and symptoms and listen for key words, but I also listen for tones and inflections in her voice and bodily gestures that also convey information on her state of being. It is this intensive form of listening that directs me towards a deeper understanding of her condition and also informs my treatment strategy.²⁰⁵

It is, however, reading her pulse that provides the deepest understanding of what might be taking place internally. To take S's pulse using Chinese pulse diagnosis is to step sideways from the biomedical epistemological approach of measuring and plotting the body via grids and vectors and instead - to listen (through touch) to the warp and weft of the *shén* (spirit/consciousness), *qì* (active energy or transformative agent existing both

²⁰³ This section comprises text from an article that has been published prior to this thesis and has subsequently been rewritten and re-contextualised for this section. See the original text in Appendix II, pages 233-234.

²⁰⁴ 'S' – or using only the first letter of a name - is an anonymising method that serves to protect the confidentiality and identity of the study participants. This is standard practice in medical case studies. For further reading see GMC (General Medical Council), n.d.

²⁰⁵ The treatment strategy in acumoxa therapy refers to the set of acupuncture points a practitioner selects, (the acupoint locations along the meridians), the direction in which the needles should be inserted and twisted (these techniques affect the direction, amplitude and flow of energy and blood) and whether the points should be warmed with moxa (mugwort - *Artemisia argyi*), and so forth. These decisions are directed by specific Chinese medicine therapeutic principles. See: Lo, 2000.

within the body and throughout the universe), *jīng-luò* (the networks/meridians running throughout the body), *jīnyé* (body fluids), *xuè* (blood) and *zàng-fǔ* (organs). In using palpation to see into the interior worlds of others via perceiving and feeling, Chinese pulse diagnosis offers a form of diagnostic listening that differs from quantitatively counting heart-beats or listening for irregular sounds with a stethoscope. If a practitioner is sensitive and extensively trained in Chinese pulse diagnosis, according to early Chinese medical texts, the entire cosmology of the body and its state of consciousness can be read at the meeting place of the vessels - at the wrist (see Hsu, 1999, p.164; Unschuld, 1986, p.65).

The physical characteristics and other impressions received from each pulse reading consultation are then written down as clinical notes. This form of notation is an integral part of the diagnostic process, which also includes the processes of interpretation and recording what is clinically significant about the pulse and interpreting how these findings provide an image of what is occurring within the person in relation to the issues the person initially presents with. These diagnostic records also inform a physician on what form of intervention or tactic they might adopt.

It is this juncture within the clinical encounter, the diagnostic processes, which this project uses artistic research to materialise and extend. Instead of participating in the stabilization of diagnostic meaning, i.e., the *ipso facto* relationship between a presenting problem, diagnosis and treatment; in this project, I use graphic notations to highlight the materiality of the diagnostic process in ways that exploit, tease out and *elongate* the moment of experimental 'inscription' (see Latour and Woolgar, 1979, p.88) and medical speculation. Thus, when the diagnostic process becomes purely creative, clinical notes are transformed into soundscapes, graphic notations and drawings... the moment of the encounter between oneself and others becomes a form of music.

The Body Ecologic

This thesis focuses on a set of interrelationships between microcosm and macrocosm, particularly the ecology of relationships between the body and environment, between oneself and others within social milieus and between cultural socio-technical practices. In this section, these sets of interrelationships are developed further within the rubric of the 'body-ecologic' (Hsu, 1999, pp.80-83). This will be elaborated through providing a discussion on CM's mapping of the body in relation to its environment and the wider movements of temporal cosmic processes.

The early Chinese development of the ‘body ecologic’ has a crucial significance for the creation of my compositions for *Pulse Project* - specifically the notion of the body itself as a relational and temporal interface. Therefore, in the next few sections of this chapter I first give a basic account of the alchemical body-ecologic and the patterns that describe the body’s interface with the exterior environment (called *zhèng*) according to Chinese medicine²⁰⁶ for the purpose of providing a foundation for these concepts.²⁰⁷

To construct a basic outline of the body according to Chinese medicine, I first draw attention to the fact that this body has a complex history of construction over time that is not only tied to the methods and concepts that the early Chinese deployed to organise agricultural life, but their medical philosophy was also constructed in relation to political events (see Unschuld, 2003, p133-136). In *The Transmission of Chinese Medicine* (Hsu, 1999) Hsu attests to the early Chinese construction of the body as an ecological and political organism in the following passages:

‘The notion of the “body ecologic” highlights the idea of mutual resonance between macrocosm and microcosm and the continuities between the inside and the outside of the physical body. The “shared substrate”, qi, that permeates the universe constantly transforms itself: qi is not only in constant flow, but also in constant flux (in the sense that it is subject to constant transformation). This conception of the body as part of its environment is characteristic of Chinese medicine. Notably, the “body ecologic” is, like the body politic, intricately intertwined with its environment, so body and environment cannot be dealt with as separate entities. This contrasts with the [Western] notion of the individual and the social body, which refer to a clearly bounded, “classical” body.’ (Hsu, 1999, p.82)

In keeping with this approach, of a body-politic that both maintains a coherence and an openness to indeterminate processes of life, the CM constitution of the body is as an interfacing organism that is actively shaped by its relationship to natural and sociocultural structures – structures that are themselves in continual states of transformation. Also central to the CM organisation of the body is that it is a ‘holistic’ organism (see Leung, Xue and Cheng, 2003, p.48) of different interrelated substances and essences that are shaped and mediated by the alchemical processes of *yīnyáng* and *wǔxíng*.²⁰⁸ The Chinese observed *yīnyáng wǔxíng* processes to be animate within all forms of being-in-nature – including animals (see Imrie, et al., 2001) – as a cosmological process. In order for life to manifest, the primordial substances of *yīn* and *yáng*, which are opposite in nature and expression, must maintain a continual process of relative interaction, mutual restraint and interdependence, because when *yīn* and *yáng* separate, death occurs (see

²⁰⁶ The Chinese medical body I focus on here is the account given in modern Traditional Chinese Medicine texts, which is a simplified modern version created from the vast body of diverging medical theories recorded and amended for over a millennium. For an excellent and thorough analysis of this process, see Taylor, 2004.

²⁰⁷ These concepts are explored further using artistic practice-based research in Chapter Four.

²⁰⁸ Refer to the Glossary in Appendix I for a definition of these terms.

Bialock, 2007, p.81).

In addition to the perpetual dynamics of *yīnyáng*, *wǔxíng* describes the cosmological processes of the five elemental phases that are made manifest by the changing of the seasons and the transformations of natural phenomena associated with these seasons, such as: Wood²⁰⁹ (materialised by the powerful growth and movements of spring), Fire (materialised by the heat and upward expansion of summer), Earth (materialised by the languid abundance of late summer), Metal (materialised by the contracting strictness of the autumn harvest) and Water (materialised by the cooling, sinking and storing capacities of winter). These elemental phases (see Figure 7) are expressed both within the body as functional essences and processes, and also exterior to the body, via the manifestations of the seasonal processes themselves.

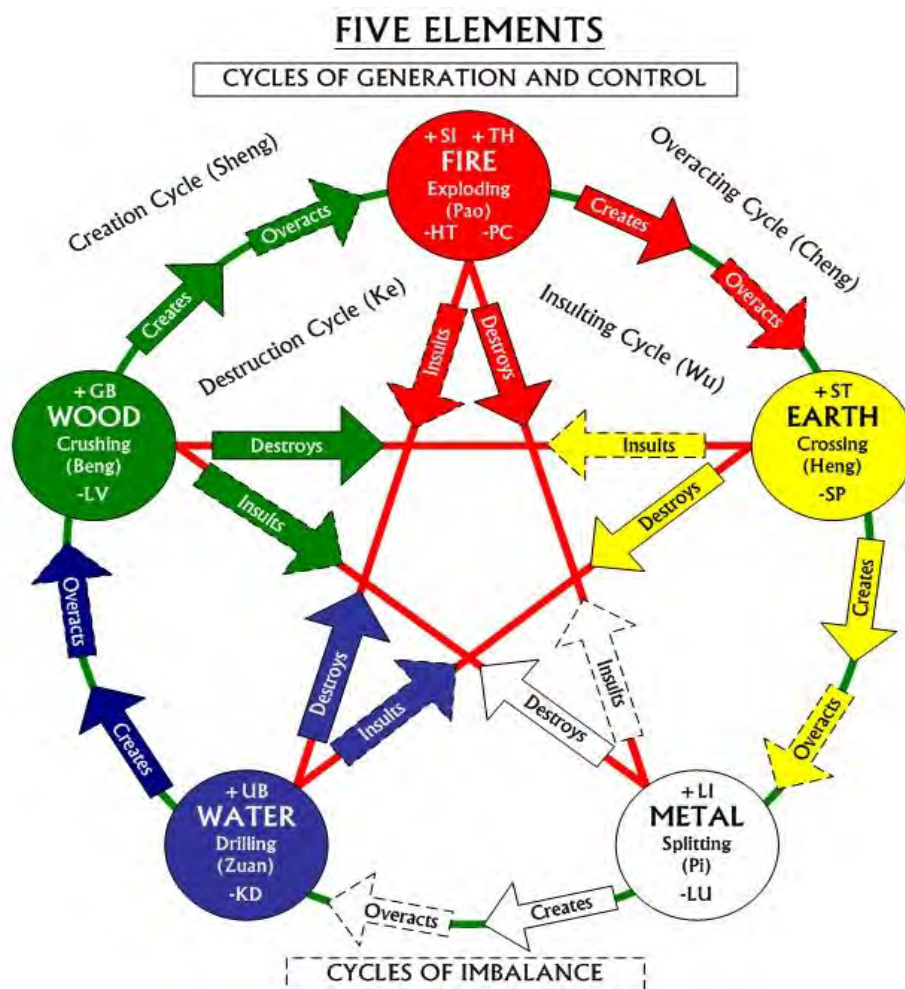


Figure 7: *Five Elements: Cycles of Generation and Control* (2007). [Digital image] Don Reynolds. Public Domain Attribution. Source: Wikimedia Commons.²¹⁰

²⁰⁹ These elements are capitalised to emphasise their distinctness as Chinese philosophical concepts and are therefore not to be associated with their standard use.

²¹⁰ This image demonstrates the inter-relational directions and expressions of the generating (reinforcing) and controlling cycles of *wǔxíng*. The first cycle travels in a clockwise direction, with

Within the body, there are also vital substances that are animated and shaped by interior and exterior *yīnyáng wǔxíng* processes. These substances are named: *qì*, *shén*, *xuè*, *zàng-fǔ* and *jīng-luò*. Roughly translated, these terms are described as the following: *qì* is the primordial substrate of the cosmos (active both interior and exterior to the body), *shén* represents the embodied spirit that connects the human and animal mind with the cosmic mind, *xuè* represents blood, *zàng-fǔ* is a term describing the *yīn* and *yáng* organs of the body and *jīng-luò* describe the *yīn* and *yáng* organ-networks of the body – called ‘vessels’ in the classic texts (see figures 8-10).²¹¹

The body itself is organised into five *zàng* (*yīn*) organs: the Heart (includes the ‘Pericardium’), Spleen, Lungs, Kidneys and Liver; and six *fǔ* (*yáng*) organs: Small Intestine, Large Intestine, Gall Bladder, Urinary Bladder, Stomach and Triple Heater (*sān jiāo*)²¹² (see figures 8-9). These organs each have an associated energy reservoir or network (*jīng-luò*) that runs between the (*yīn*) internal organs and the outer (*yáng*) periphery of the body (see Unschuld, 1986, p.408). The *zàng-fǔ* pairs are also each associated with the *wǔxíng* processes mentioned above. For example, the Stomach and Spleen are associated with ‘Earth’ processes, the Lung and Large Intestine with ‘Metal’ processes, the Kidney and Urinary Bladder with ‘Water’ processes, the Liver and Gall Bladder with ‘Wood’ processes, the Heart and Small Intestine with ‘Fire’ processes and the Triple Heater and Pericardium with ‘Ministerial’ Fire processes (see Unschuld, 1986, p.256).²¹³

The *zàng-fǔ* and their associated *jīng-luò* are the most directly affected by the dual nature of exterior and interior *yīnyáng wǔxíng* processes. Within this entangled continuum of the body-environment relationship, it is important to note that the body and mind are not separate, but are connected together via the *zàng-fǔ jīng-luò* into a cohesive a *bodymind* (which is directed by the *shén*).²¹⁴ Thus the body exists as a complex entity of alchemical substances in a constant state of transformation both internally and also in relationship with the unfolding dynamics of external influences and processes. These concepts are further demonstrated in the figures below:

the expression and development of each element gaining strength from the elemental phase that precedes it, i.e., Earth creates and supports Metal. The ‘insulting cycle’ (represented by the red arrows) is used as a ‘controlling cycle’ in Chinese medicine to facilitate one elemental process to control another elemental process from excessive expression or over-development (see Maciocia, 2015, p.20). The destroying cycle describes a counter-flow of the natural order that would create a situation of either internal (as in the body) or external devastation - depending on what one is applying *wǔxíng* principles to (the body or other natural phenomena).

²¹¹ Refer to the Glossary in Appendix I for a definition of these terms.

²¹² The organs as conceived of by Chinese medicine are capitalised here to differentiate them from the same organs recognised in conventional medicine.

²¹³ As mentioned in Footnote 139, there is no separation between the mind and body but they are understood to form one continuum - the *bodymind*. See also: Kaptchuk, 2000, p.298.

²¹⁴ Refer to the Glossary in Appendix I for this term.

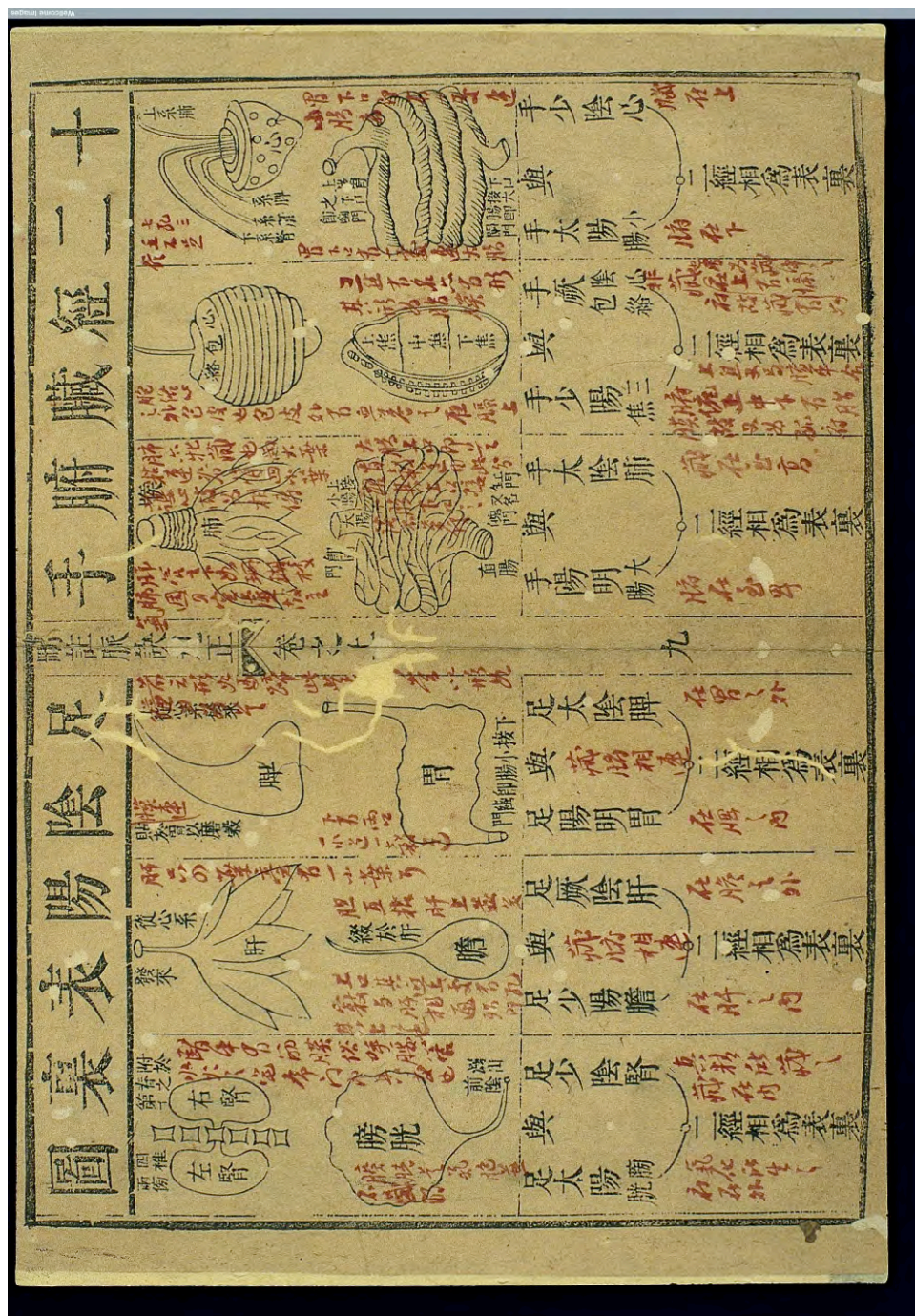


Figure 8: Interior and Exterior Relationships of the Twelve Channels of the Hand and Feet (Qing Dynasty 1644-1911). Shen Jing. [woodcut] Creative Commons Attribution. Image: Courtesy of the Wellcome Trust Library.²¹⁵

²¹⁵ This image 'was published in 1909 as part of the inaugural year of the Xuantong reign period of the Qing dynasty' (see Wellcome Trust, 2015b) and is attributed to Shen Jing sometime during the Qing Dynasty. This woodcut illustrates the *yīn* and *yáng* (interior and exterior) relationships between the twelve *zàng* and *fǔ jīng-luò* (organ-channel network). Starting from the bottom of the illustration: 1. Water - the Kidney (*yīn*) and the Bladder (*yáng*). 2. Wood - the Liver (*yīn*) and the Gall Bladder (*yáng*). 3. Earth - the Spleen (*yīn*) and Stomach (*yáng*). 4. Metal - the Lung (*yīn*) and Large Intestine (*yáng*). 5. Ministerial Fire - the Pericardium, which looks like a bees nest (*yīn*), and the Triple Burner (*yáng*). 6. Fire - (at the top of the image) the Heart (*yīn*) and Small Intestine (*yáng*). The text illuminates on how these organs also share a 'six-level' system of further inter-correspondence between organs. For instance, the Lung and Spleen *zàng* are paired to form the

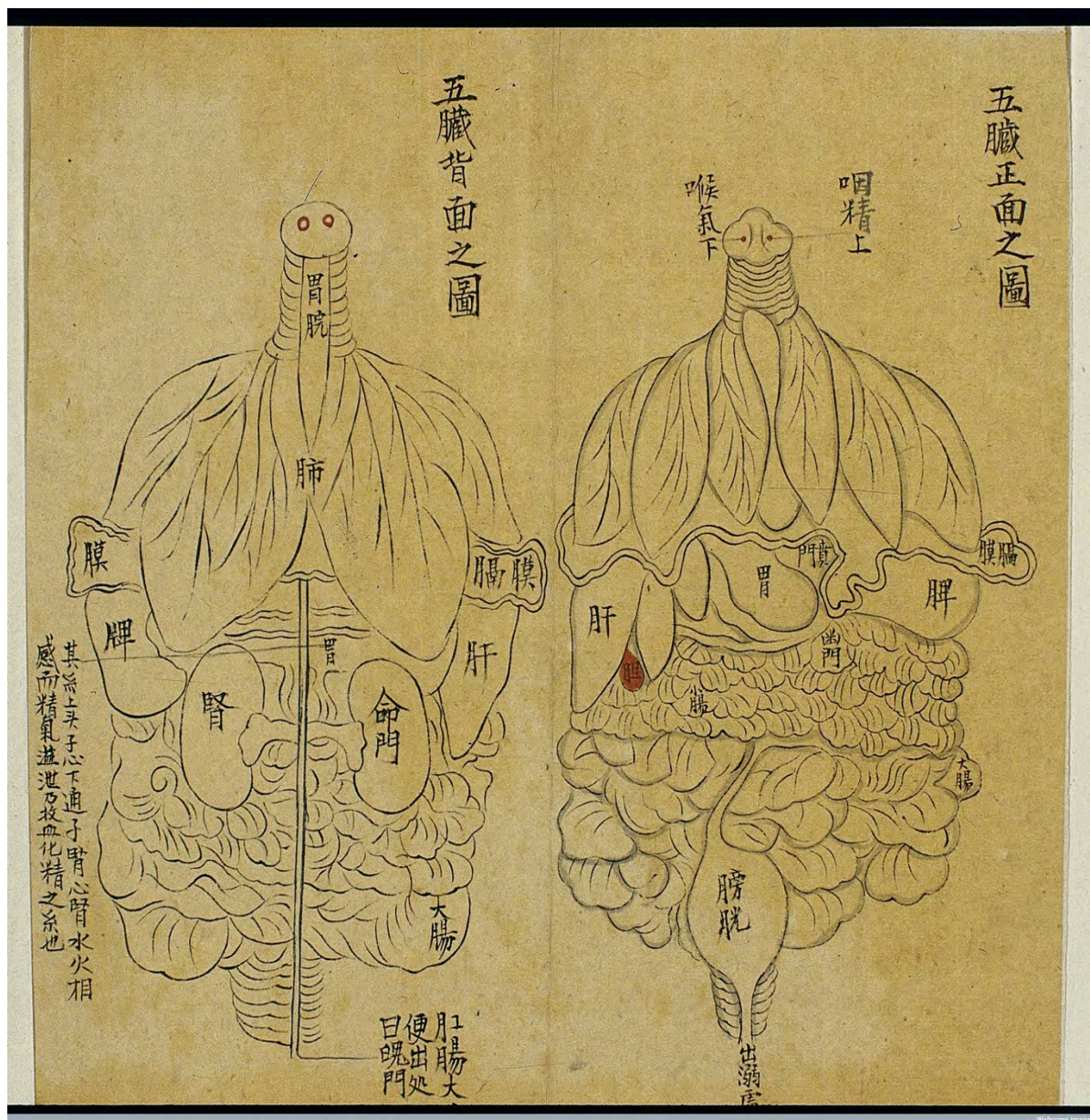


Figure 9: *Wuzang Tu* (Illustrations of the Five Viscera) (Qing Dynasty 1644- 1911). Anonymous. Creative Commons Attribution. [ink drawing]. Image: Courtesy of the Wellcome Trust Library.²¹⁶

taiyin jīng-luò, the Stomach and the Large Intestine *fū* form the *yangming jīng-luò*, and so on.

²¹⁶ This drawing has an uncertain origin and it is not possible to tell if these anterior and posterior drawings of the Five Viscera from the *Lingmen chuanshou tongren zhixue* (The Lofty Portal Teaching Text of Acupoints on the Bronze Man) - a Qing dynasty text - are reproductions of pre-Song dynasty illustrations. The drawing on the right-hand shows the *zàng-fū* from the perspective of the front of the body, such as the Liver, Gall Bladder, Spleen, Stomach, Large Intestine, Small Intestine, Bladder and Pericardium. The drawing on the left-hand demonstrates the *zàng-fū* from a posterior perspective, showing the Lung, Kidney, *Mingmen* (The Kidney on the right side is referred to as the 'Gate of Ministerial Fire' or 'Mingmen'), Liver, Spleen, Large Intestine, and Pericardium (see Wellcome Trust, 2015c).



Figure 10: Channels and Distributions of the Acumoxa Locations of the Side of the Torso (1763). Chen Tingquan [woodcut]. Creative Commons Attribution. Image: courtesy of the Wellcome Trust Library.²¹⁷

²¹⁷ This image from the Qing Dynasty represents the Kidney, Liver, Stomach, Spleen, Gall Bladder, *Sanjiao* and Pericardium *jīng-luò* and their respective acupuncture points.

Zhèng as Matrixial Interface

As stated earlier, the interface process operating between the body-ecologic of the *zàng-fǔ jīng-luò* in relation to the exterior (cosmological) environment is what *Pulse Project* draws upon to inform the resulting performances, notations, soundscapes and installations. Therefore, this section focuses on the bodily interface that connects the interior body with the exterior cosmological environment, which is characterised by the concept of *zhèng* (see Scheid, 2014, p.107; Wang and Xu, 2014, p.S-13). *Zhèng* is a CM conceptual entity that represents a body of complex patterned interactions that can exist in the continuum between the interior of the body and the exterior climate. *Zhèng* encompasses a detailed system of differentiation and analysis that is used to determine (prognosticate) the interior condition of the body's substances and processes in relation to exterior factors such as wind, heat, cold and dampness – or in relation to internal pathological processes such as Spleen Dampness and Heart Fire and/or by excessive fixation on emotions such as fear,²¹⁸ grief,²¹⁹ anger²²⁰ and so on.

Determination of *zhèng* patterns within the body is maintained via clinical observation methods such as: looking, listening, questioning and particularly pulse analysis (see Jiang, et al., 2012, n.p.). Since providing a detailed theoretical overview of *zhèng* patterns is beyond the scope of this project, instead I describe one example of *zhèng* that makes my use of this concept in *Pulse Project* clearer.

Whilst in biomedicine it is possible that two or more persons can be placed within the same diagnostic category, when using *zhèng* differential diagnosis, each person will present with unique configurations of internal/external patterns with a particular aetiology that thus requires a personalised approach to treatment strategy (see Jiang, et al., 2012, n.p.). For example, a person arrives in the clinic during a heat wave and they have a medical history of what biomedicine terms as 'gastritis.' There are several *zhèng* diagnostic patterns in CM for the one-size-fits-all diagnosis of gastritis, such as Damp Heat invasion (an exterior pathological entity which has invaded the Stomach directly – something that is more likely during a heat wave), Liver Qì Stagnation and Depression (an internal energy-blood dynamic created by constrained emotions), Liver Qì Invading the Stomach (this occurs when a person's emotional constraint becomes compounded), Stomach Deficiency Cold (cold in the Stomach *fǔ jīng-luò*), Spleen Deficiency Cold (cold in the Spleen *zàng jīng-luò*), and so on (see Jiang, et al., 2012, n.p.).

To determine which direction and shape the malady will take, the CM physician typically

²¹⁸ Associated with Water processes.

²¹⁹ Associated with Metal processes.

²²⁰ Associated with Wood processes.

conducts a pulse analysis to assess the characteristics of vibration along the Stomach/Spleen *zàng-fǔ jīng-luò*²²¹ as they are perceived in relation to the pulse-wave characteristics of other organ-networks and also in relation to exterior climate conditions such as heat, cold, damp, wind and aridity. Following the identification of the correct pattern, a treatment response, or *lùnzhi* (prescription) is typically performed by applying needle techniques on specific acupuncture points - or by formulating herbal strategies to initiate a set of pharmacodynamic actions within the body that correspond to the *zhèng* pattern differentiation (see Scheid, 2002, pp.209-211). These interventions are thought to either strengthen what is deficient or interrupt and reduce the pathogenic processes within the *zàng-fǔ jīng-luò*. This occurs by strengthening the body's anti-pathogenic response (*zhèng qì*) and clearing the body of any pathogenic substances (*xíe qì*). The overall aim is to use *zhèng* as an interface, as a set of strategic concepts and interventions in order to create a balanced and harmonic resonance between the interior and exterior layers of the *zàng-fǔ jīng-luò* and the exterior environment (see Caballero, 2014, pp.60-61). Thus *zhèng* is a system for mediating the *ecological* body.

For this project, instead of focusing on the identification of pathology as described above, I use the concept of *zhèng*²²² and pulse analysis as methods in my performances and soundscapes to investigate and determine what occurs at the interface between the body and its environment and between my body and research participant's bodies. Thus my notating the unique vibrations contained within people's pulses and composing unique soundscapes is a form of sonic medical prescription,²²³ as these artistic methods materialise the scientific processes of CM pattern differentiation. Hence, when I adapt *zhèng* into an artistic research method, this adaptation produces a new integration of artistic and medical techniques for creating knowledge of the ecological body.

The Clinical Encounter as Sculpting Processes: *Zhèng*, *Shén* and *Yi*

In this section I contextualise *zhèng* as an interface technology that can connect CM practice with contemporary art practice. In *Pulse Project*, I use the diagnostic (medical) aspect of *zhèng* to call attention to its artistic and technological²²⁴ capacities. Thus, *zhèng*

²²¹ See the section entitled 'An Introduction to Chinese Medicine and Music Theories Informing Each Composition' in Chapter Four for a better explanation of this and its relationship to my research.

²²² This materialisation of pattern identification and Chinese pulse analysis is explored throughout Chapter Four.

²²³ This is explained further in the section entitled, 'Soundscape Composition as a Healing Modality' in Chapter Four.

²²⁴ I am referring to the development of soundscapes and audio interfaces that demonstrate the

is adopted in this research as a rubric that can interweave artistic, medical and technological (AST) modes of investigation into a methodology that interprets the *relational body* – the intersectional body that is at once a coherent structure and an interface continuum that inter-relates with cultural and socio-physiological environments via the internal/external processes of *yīnyáng wǔxíng* and perceptual consciousness. In this way, *Zhèng* (as an interfacing methodology) can be used to produce new material knowledge of the alchemical, changeable and imperceptible connections between research participants and myself (as artist-researcher).

Zhèng can also be understood as a spiritual interface - as a technology that can interpret the embodied communications between oneself and others. Within the co-present time-space of the pulse analysis, interpretation of another person's relational body requires a precise reading of the comings and goings of their bodily 'breaths' and 'spirits' (see Larre and Rochat de la Vallée, 1995, p.6). This is a mode of analysis that requires the inter-communicative faculties of the practitioner's *shén* and *yì*.²²⁵ This spiritual method for listening and interpreting is discussed in the *Língshūjīng* or the 'Spiritual Pivot Classic' (dated 1 BCE, see Sivin, 1993), which is one of two texts that comprise the *Huang Di neijing* (475-221 BCE).²²⁶ In their translation, Larre and Rochat de la Vallée interpret a passage from the *Língshūjīng* on the diagnostic role of pulse analysis (*zhèng*) within the clinical encounter as follows:

'[The] practitioner's diagnosis is a connection from deep within himself to the Spirits [*shén*] of the patient, which are showing signs [*zhèng*] recognisable to the practitioner. There is free communication between [Five] Spirits.²²⁷ The signs perceived by the acupuncturist are the different observable states of the Breaths, which themselves depend on Essences. The attentive and properly oriented human spirit [*shén*] quickly and infallibly interprets [through the faculties of the *yì*] the rapport of the Essences/ Spirits. Thus he goes at once to the seat of the malady.' (Larre and Rochat de la Vallée, 1995, p.6)

This is central to my understanding of rapport and listening as *zhèng* – as a diagnostic method that draws upon the faculties of intuition and intent (*shén* and *yì*) as integral to medical methodology and meaning-making. Viewed this way, *zhèng* becomes an interface between oneself, others and cultures. It becomes capable of producing both diagnostic and poetic articulations of particular human-lifeworld relations. Anthropologist and CM physician Professor Volker Scheid further elaborates on the interrelationship between the concepts *zhèng* (as a medical interfacing systematic) and *yì* (as the human

body's ecological relationship with its environment according to CM. These audio interfaces are discussed in greater detail on pages 96-101 and 143-144.

²²⁵ Refer to the Glossary for definitions of these terms.

²²⁶ The exact dates are unknown; see Footnote 197 for discussion of this text.

²²⁷ The Five Spirits (of the body) are: *shén*, *hún*, *pò*, *zhì* and *yì* – which were discussed in Footnote 161 and a definition of these terms can be found in the Glossary in Appendix I.

faculty of apprehending, focusing and intending)²²⁸ by discussing how together *zhèng* and *yì* form a 'knowing-practice'²²⁹ (see Scheid, 2014, n.p.). Thus within the context of *zhèng* as multidimensional analysis, Scheid delineates the various functions of *yì* as perceptive practices that generate unique cross-disciplinary and cross-temporal configurations of personal, poetic, medical and cultural knowledge in the following passage:

'*Yì*, like *zheng*, is a concept with multiple meanings... In Chinese literary thought, *yì* frequently denotes the conceptions of things through which the heart/mind [*shén*] grasps the external world. These conceptions, in turn, become the source of literary or poetic expression. *Yì*, therefore, is an awareness located both before and beyond words. The poet Mei Yaochen, for instance, defined *yì* as something vague and indeterminate that through its very haziness guaranteed authenticity. For "when a writer has attained it in his own heart/mind, the reader will comprehend it through *yì*," precisely because the meanings in the images conveyed through poetry and language "appear beyond the words" (Owen, 1992, pp.376–78 cited in Scheid, 2014, n.p.). Similarly, for the Song statesman and philosopher Wang Anshi, *yì* denoted the conceptions one makes out in the work of the sages on which one models the formulation of concrete policies... The mediating capacities of *yì* as a necessary link between focused perception and effective action thus not merely rested on cognition but extended to bodily practices, ethical orientations, and an aesthetics that perceived a lack of detail, the indeterminate, and that which can be experienced but not put into words not as a hindrance but as essential to the production of effective medical practice.' (Scheid, 2014, n.p.)

It is the perceptive and poetic functions of *yì* (within the clinical act of *zhèng* analysis) as discussed here by Scheid that enable interconnections between art and medicine – and of thinking aesthetically about how the body builds medical knowledge of others. Thus Scheid's adaptation of *yì* and *zhèng* (as medical concepts that philosophically connect ancient China with contemporary culture and also articulate the aesthetic, relational and somatic processes of CM) aligns with the cross-connections I make in this project between my experiences as a sculptor²³⁰/sound artist with my experience of performing medicine in the clinic. The experience of using *yì* to navigate and attune the flows of energy within and between my own and another's body for me took on the significance of sculpting – of creating resonant meaning from the intentional process of dynamically shaping the energetic inter-relationships between practitioner and participants/querents within the time-space of the clinic. These 'energy fieldscapes'²³¹ are created both externally – through palpating, pulse reading and building interpersonal rapport – and internally by the placing of needles into acupoints where the *qì* currents of

²²⁸ See the Glossary for a discussion on *yì*.

²²⁹ See Scheid, 2014, n.p., and Farquhar, 1994, p.202 who develop the concept of *zhèng* as a 'knowing practice' that brings a multiplicity of knowledge to 'bear on the human.'

²³⁰ I mention sculpture here to refer to the physical processes of sculpting, rather than sculpture as the creation of static objects.

²³¹ This is my term and emphasis.

the *zàngfǔ* coalesce. In positioning acupuncture needles as pivots that collect, direct and circulate *qì* throughout the *zàngfǔ jīng-luò* (see Hougham, 2002, pp.24-26; Rossi, 2000, pp. 43-44), our bodies become at once coherent and intra-relationally²³² multidimensional.

The Sculpting of Infrasound (Qì)

'I propose to return through the theatre to an idea of the physical knowledge of images and the means of introducing trances as in Chinese medicine which knows, over the entire extent of the human anatomy, at which points to puncture in order to regulate the subtlest functions.' (Artaud, 1958, p.80)

Manning's (2009) *Relationscapes* as a philosophy of movement is particularly relevant to mention at the opening of this section as her writings correspond to the shaping of the invisible embodied processes of *yì*, *shén* and *qì* (or the *bodymind*) in clinical practice. Manning's development of an intentional performance-oriented philosophy that 'bridge[s] the gap between thinking/speaking/doing/creating' (Manning, 2009, p.2) identifies and opens up new thinking-doing-participating practices that give testimony to the resonant relationscapes of the CM clinical encounter described in this section. As sound is the main medium this project uses to materially articulate a new sonic discourse on the rhythmic relationscapes of the CM clinical encounter, the remaining paragraphs of this section thus discuss sound and infrasound in relation to the creation of energyscapes within the clinic.

Given the tangible yet invisible properties of sound, e.g., its patterned agitation of matter, its all-pervasive unfoldings through time-space and its capacity to blur the distinct boundaries between the solid and the immaterial – working with sound for me formed a natural progression towards working with the concept of *qì* as an acupuncturist. As stated previously, one of the main methods of working with the body's *qì*²³³ is inserting needles into a selection of designated locations across the entire body.²³⁴ Once the needle is inserted, it is manipulated using a variety of techniques that require the focused concentration of the practitioner, i.e., a heightened awareness of the sensations that are being experienced by both acupuncturist and acupuncture participant. These sensations

²³² See pages 48-49 for my discussion on Barad's concept of intra-action and quantum (intra)relationality.

²³³ See Glossary for a definition of this term.

²³⁴ These locations are referred to as 'acupoints' (acupuncture points). Each point has a unique name with a significant meaning, such as *bǎi huì*, which is located on the midline of the head, in the depression slightly posterior to the very top of the crown. *Bǎi huì* roughly translates as 'one hundred meetings.' This refers to its location as a place where the five *zàng* and six *fǔ* channels converge and where the *yang* of the body converges to communicate with the 'cosmos.' See Eliis, Wiseman and Boss, 1989, pp. 149, 288, 304.

are referred to as 'needling sensation' or '*dé qì*' (see Yang, et al., 2013, p.1).

The input of energy (torque) from the needle is directed into and along the channel/network system – a direction that is determined by both the twisting techniques and the 'intention' [*yì*] of the acupuncturist²³⁵ during the insertion of each needle. When the needle is placed within an acupoint, mindful and gentle pressure is maintained to guide the needle downwards below the surface of the skin in search of the layer where *dé qì* can be felt. This *dé qì* sensation can be felt/experienced by both acupuncturist and patient (see Yang, et al., 2013, p.1). The bodily 'layers' where *dé qì* is experienced varies widely and corresponds to the internal energetic morphology of an individual's *jīng-luò* (vessels and channels). It is also affected by the strength or weakness of vibrational frequencies travelling along the channels and also by the relative levels of heat, stagnation or cold manifesting within the organ-networks.

Dé qì, as experienced by the acupuncturist, can be characterised as 'arriving,' 'grasping,' 'pulling down' or 'quickenings' sensations that are conducted via the range of techniques the acupuncturist adopts in manipulating the needle (see Yang, et al., 2013, pp.1-2). For the patient, the main physical sensations have been described as: '*suān* (aching or soreness), *má* (numbness or tingling), *zhàng* (fullness, distension, or pressure), and *zhòng* (heaviness)' (Yang, et al., 2013, p.1).

In 2011, Professor Wang Xi-Ming conducted a study researching the relative health benefits of augmenting the infrasonic waves within the meridians in which he argues:

'The lifting, thrusting, and twisting needle can produce 215 Hz vibration frequencies. This infrasonic vibration frequency eventually transmits through the meridian route... Acupuncture treatment process increases the intermolecular interaction potential energy [and] makes the molecules of meridian matter produce directional vibration. [This process] carries the external energy to transmit through wave vibration form [along the meridian].' (Wang, 2011, p.71)

Wang's study, and a similar study that researched needle manipulation of specific acupuncture points to measure the positive effects on the microvascular system conducted in 2012 (see Huang, et al., 2012), both clearly identify the presence of *qì* as infrasound within the body²³⁶ and the ways in which this infrasonic energy or *qì* can be shaped, directed and manipulated within the body by acupuncturists to benefit the health of patients.

Therefore, I refer to these studies to evidence discussion on *qì* as a form of infrasound and to identify needling techniques as methods for working with infrasound as a life-enhancing sculptural material. These studies make explicit my own experience with *qì* as

²³⁵ 'Intention' of the physician refers to a CM physician using their intentional thoughts and energy to move a patient's *qì* towards the direction(s) that the body's *qì* ideally needs to travel - according to CM therapeutic principles. For a detailed account of this phenomenon, see Hsu, 1999, pp.70-71.

²³⁶ I base this on the claim made within the study itself, see: X.M., Wang, 2011, p.71.

an imperceptible yet vitally powerful phenomenon that possesses the capacity to reverse illness. By rotating needles at the body's acupuncture points, the vibrational force of the practitioner's needle technique (torque) either increases or reduces the amplitudes of infrasonic resonance along the *zàng-fǔ jīng-luò*. By rotating the needle clockwise, this strengthens weak oscillatory performance of the organ-network,²³⁷ whereas twisting the needle counter-clockwise will interrupt and disperse excessive amplitude of discordant oscillation along particular networks. In using these methods for fine-tuning the body's infrasonic flow, the micro-processes of maladies can be interrupted and diminished (see Wang, 2011, p.71; Yuan, et al., 2013, p.1, Huang, et al., 2012, n.p.). Consequently, practicing these acupuncture needling techniques offers a unique and multi-layered approach to medical meaning-making by enabling both the performative sculpting of the body's infrasonic fields, the performance of medical knowledge and the activation of the participant's affective healing response (via their embodied energetic interaction with the practitioner's needling techniques and medical intent).

These experiences described above form the foundation for my thinking of the body as a symphonic event - a concept that underpins all creative works produced in this project. Thus the concept of the infrasonic body is used together with the clinical concepts of *zhèng*, e.g., the body as interface, CM as interface between art and medicine and pulse pattern differentiation – to inform the artistic investigations of this project.

Furthermore, this project's creative research also informs my clinical practice as I use my artistic practice to open up a reflective space within the confines of the clinical encounter that enables me to more freely explore the intuitive and aesthetic dimensions of pulse diagnosis and treatment formulation. For example, when conducting case histories and pulse analyses, I listen to and notate information that exists both within and outside of the classical nosologies²³⁸ of *biàn zhèng* (diagnostic differentiation) to capture a more individual and poetic portrait of what occurs internally within another person (and also in-between us). In this way, the creative processes of listening and abstraction add extra dimensions to the problem solving processes in the clinic.²³⁹

Lastly, the transdisciplinary intercommunication between clinical and artistic practices discussed throughout this chapter forms the conceptual basis for this project's practice-based outputs, which are outlined and discussed in the next chapter.

²³⁷ This weakness is discerned during pulse analysis.

²³⁸ Nosology is defined as 'a classification or list of diseases' (Merriam-Webster, 2015).

²³⁹ This paragraph is a rewritten excerpt from one of my previously published articles. See Appendix II, page 203.

4. *Pulse Project*: Practice-Based Works²⁴⁰

²⁴⁰ This chapter comprises texts published prior to the submission of this thesis that have been rewritten and re-contextualised for this thesis. Each section will therefore contain a footnote detailing the location of the original text in the Appendix II.

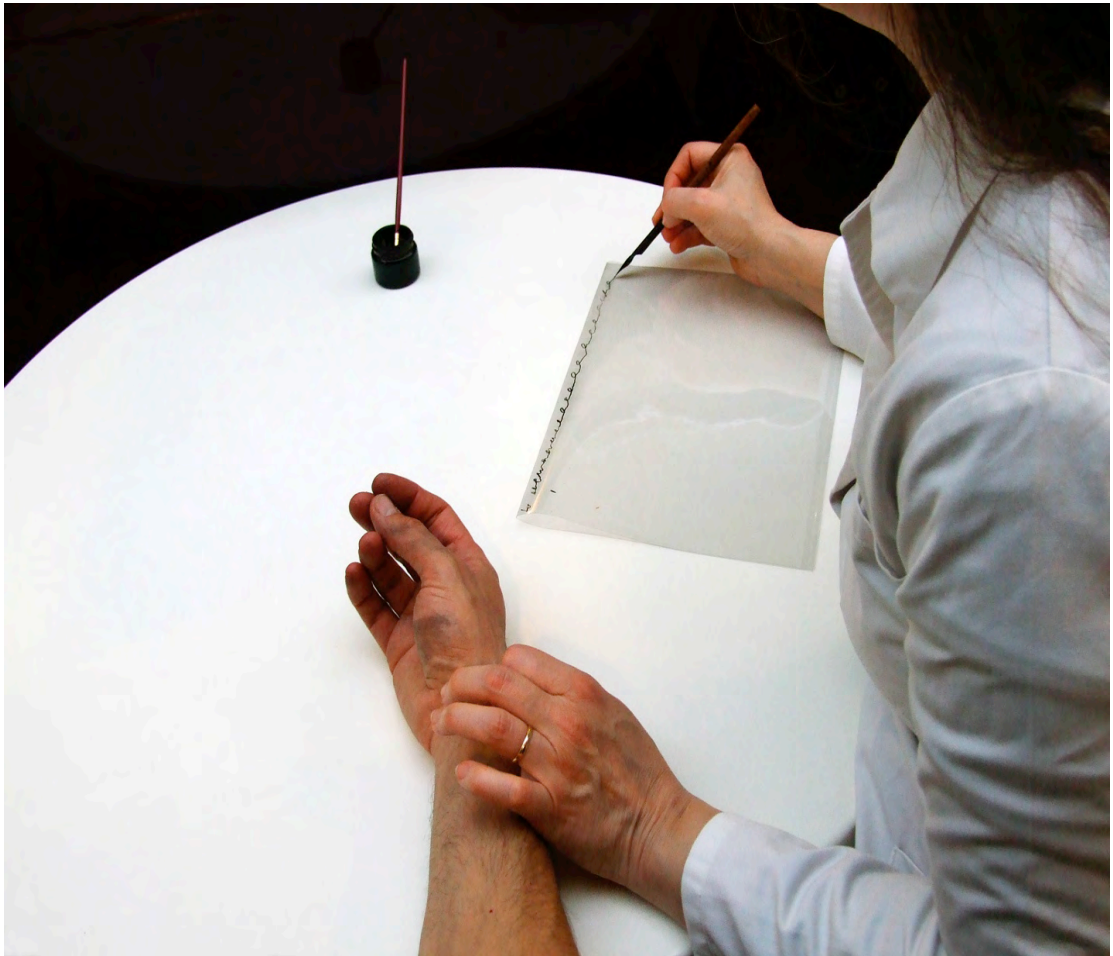


Figure 11: *Pulse Project Performance* (2011-2016). © Michelle Lewis-King. Photo: Léna Lewis-King.

Preface

This chapter provides an analysis of the practice-based transdisciplinary knowledge *Pulse Project* generates. Each section explores the significances of the specific methods created for this project - methods such as performance consultation, case-study notation, pulse analysis, soundscape composition and sound installation. This chapter also includes discussion of research processes that are conducted extrinsically, but in relation to this project, such as peer review, participatory research and collaborative research processes.

***Pulse Project* (2011 - 2016)**

Pulse Project is a performance and sound study series that creates new knowledge of the body through drawing connections between artistic, medical, and technological practices. In this study, I embody research practice itself through becoming an instrument or

investigative medium between others and myself and between cultural traditions for understanding and mediating the body. Pulse reading, case studies, live notations of pulses and programming soundscape compositions and installations are all methods that are used together to create a system of heuristics for exploring socio-cultural experiences of art, medicine and technology.

SuperCollider (an audio programming language)²⁴¹ is used to compose personalised algorithmic soundscapes that offer another perspective with which to conceive of and listen to the interior spaces of the body - as each participant's pulse is interpreted into a unique set of sound-wave images based on Chinese pulse diagnosis and also according to traditional Chinese music theory. Moreover, this project uses diagnostic touch and interpersonal dialogue as artistic methods to enable the development of a mutual accord between participants and myself (as the researcher); and it is these forms of listening – a listening as *being-withness*²⁴² - which informs my composing soundscapes for each participant.

Consequently, *Pulse Project* engages with and is responsive to research participants within the research process. Each case study reflects both aesthetic and medical impressions of a participant's ontology and also adds the participant's commentary to the overall artistic production/ aesthetic knowledge processes of this thesis. In this way, researcher-participant communication allows for an ethical acknowledgement of the processes by which knowledge is produced *between* the researcher and participants.

Situating *Pulse Project*²⁴³

This section discusses *Pulse Project* in relation to Situational Theory, which states that the given factors of a situation are more useful for determining the behaviour of actors within the situation than any inherent 'virtue' of the actors in the situation, such as their morals, values and attitudes (see Kamtekar, 2004, pp.458-459). In establishing the focus on an environment and a given situation, e.g., the clinic as research context, as a key factor that determines the types of interaction and outcomes of activities in this study, I also adopt psychologist James Gibson's (1977) terms 'affordances and constraints' to provide an

²⁴¹ See the Glossary in Appendix I for a more detailed description.

²⁴² Being-withness refers to a transsubjective state of exchange where, rather than being *witness* to another person's being, the emphasis within the interpersonal encounter shifts from viewing each other as two distinct actors, towards a being *with* another - where somatic states of emerging consciousness can be communicated interactively between actors. See B.L. Ettinger, 2006, pp.142-146.

²⁴³ The original (published) text for this rewritten section can be found in Appendix II page 206-208.

analysis of the situational factors of this project. Gibson's affordances can be defined as the following: 'In any interaction involving an agent with some other system... affordance refers to whatever it is about the environment that contributes to the kind of interaction that occurs' (Greeno, 1993, p.338).

Pulse Project uses the affordances of performing aspects of the CM clinic, such as pulse analysis, in order to create interactive processes in which one actor (the investigator) directly interacts with other actors/agents (the participants in the study) within a given environment (an imaginary clinic) as a method for generating new forms of social activity and creative production. Within this performance study, the interactive processes are both physical and symbolic. The physical process involves an interactive co-performance of research through the participants' engagement with my performing an analysis of their pulses. Whereas the symbolic process involves the interaction between what agents understood and did not understand about the medical concepts (symbols) of biomedicine and Chinese medicine within the environmental context of the performance, e.g., the staging of the CM clinic. In addition to interaction between actors and symbolic systems (medicine), there is also an interactive process between two forms of medicine themselves; the interaction between biomedicine as a form of medicine that all participants were familiar with – and Chinese medicine as a form of medicine that most participants were unfamiliar with but were curious or dubious about.²⁴⁴ These forms of interaction allowed me to use touch and performance to generate new forms of interpersonal activity, discussion and creative output.

Pulse Project is located within the 'matrixial'²⁴⁵ interstices (see Ettinger, 2006) of the embodied interpersonal (internal) time-space that touch creates between one person and another. Although these performances take place in public locations, the focus of this study is concerned with the interconnected and converged environment between the research participants and the researcher within the performed CM clinical encounter. The CM encounter is recreated in this study to investigate the phenomenal ecology of intersubjective embodying through the affordance of Chinese pulse diagnosis.

Performing Chinese pulse diagnosis within the performance encounter also allows me to use a system of knowledge that dates back to the premodern era, which provides a

²⁴⁴ Out of the eighty plus people who have participated in *Pulse Project* between 2011-2016 in Europe and the UK, only one person knew what Chinese medicine was and could share in some form of active exchange of knowledge about this medical system.

²⁴⁵ Artist, psychoanalyst and philosopher Bracha L. Ettinger has developed a theory of the matrixial gaze that challenges and counters the phallogentrism of the object-subject gaze in Lacan. Ettinger adds to the feminist discourse on the body and relationality discussed in Chapter Two by resisting the traps of binary subject/object or mind/body relationships by developing concepts such as 'co-emergence,' and 'intersubjectivity-as-encounter' (see Ettinger, 2006, p.2). Ettinger's matrixial gaze perceives and affects rather than probes and authorizes (see Ettinger, 2006, pp.41-92).

direct contrast with the system of knowledge production utilised within the modern clinical encounter. Through my reimagining and performing clinical behavioural codes and diagnostic techniques in ways that diverge from standard (expected) practice, participants and I are able to co-create and reinterpret the processes of the body and reconsider the medical encounter itself. This performance process allows for us as actors to co-perform a new hybrid art-medicine investigative practice through the use of a ‘constraint’²⁴⁶ (Chinese pulse diagnosis). Using CM pulse diagnosis as a constraint allows participants and I to reinterpret and reinvent what art and medicine can become – because within the space of the performance any strict divisions between the activities of art and medicine become indistinct. At the same time, I also use a premodern knowledge system as an affordance to question the presence of hegemony between contemporary (Western) allopathic medicine and its corollary ‘other’ – traditional Chinese medicine (as discussed in the previous chapter).²⁴⁷

One of the meaningful outcomes of the performances is produced through collaborative communication between the participants and myself. This communication allows us to co-create new correspondences between medical and artistic investigation. The affordance of performing the CM clinic also provides a new approach to meaning-making because the performances offer participants a new situation where they can intimately connect with another person under circumstances that are public yet ambiguous. The context of the performance allows people to meet in a safe environment, exchange thoughts, expressions and creative works. The resulting clinical notes, graphic drawings and pulse soundscapes produce aural and visual ‘traces’ and amplifications of the moments of interaction between participant and investigator. Lastly, in the context of composing soundscapes, knowledge is produced through poetic recall of when the particularities of the rhythmic internal space-times of the person touching (the investigator) and the person being touched (the participant) were brought into communication with each other within the performance situation.

The Pulse Reading Process²⁴⁸

‘The traditional pulse examination in Chinese medicine is thoroughly embodied. It is a lingering, attentive, signifying *touch* of one person’s fingers to the wrists of

²⁴⁶ Constraint is a term used in Situational Theory to define a ‘property of relation’, an object or system that specifies the way in which agents will relate (see Greeno, 1993, p.338).

²⁴⁷ Throughout the five years of undertaking this study, the fact that all but one participant did not know what Chinese medicine is demonstrative of the predominance of biomedical culture within British and European societies.

²⁴⁸ This section is a rewritten version of a previously published article. For the original text see Appendix II, pages 226-230.

another; it is a connection made for a few minutes between two living states of qi-transformation, the patient's body expressing a condition – a dynamic state of play – to the responsive attentiveness of the doctor's body. This mutual disposition of two bodies, both engaged in “looking at illness” (*kànbìng*), has a performative dimension, of course.’ (Farquhar, 2014, p.13)

Chinese pulse analysis is a diagnostic system comprising both clinical and scholarly discourses that can be traced back to at least 221 BCE.²⁴⁹ For this reason, Chinese pulse analysis is described only very superficially in this section.

Overall, Chinese pulse diagnosis consists of carrying out a technical procedure (this is described below) in tandem with applying one's acute perceptive and intuitive intelligence. The pulse waveforms perceived during the procedure are then placed within a lexicon of twenty-eight waveform images.²⁵⁰ However, given the fluctuating nature of bodily processes and the diversity of individual perceptive-intuitive interpretations of the pulse, it must be noted that a person's pulse often varies from the twenty-eight classical nosologies. Subsequently, CM pulse analysis is open to a wide variety of interpretation (see Farquhar, 2014, p.13-14). It is precisely this allowance for individual interpretation to co-exist with standard interpretation (the twenty-eight categories) that, for me, places Chinese pulse diagnosis at the level of artistry (and why I argue that CM should remain an integral part of contemporary medicine practice in the previous chapter). This is because it is a system that uses the technology of embodied perception to perform a type of medical analysis that *includes* somatic, intuitive, metaphoric and individualised forms of interpretation as integral aspects of its measuring process.²⁵¹

The Chinese Pulse Diagnosis Procedure

On each wrist, there are three positions where the fingers are placed in order to palpate the pulse, making a total of six positions of palpation altogether (refer to figures 12 and

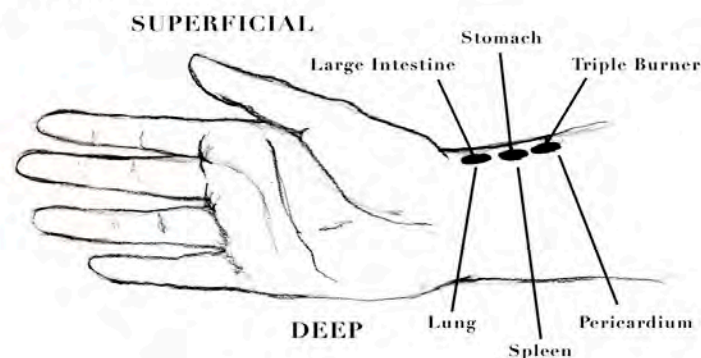
²⁴⁹ Again, one of the earliest records on pulse diagnosis can be found in the *Mǎwángduī* and the *Huángdì Nèijīng* classic medical texts from the 2nd century BCE. This was discussed earlier in Chapter Three, in footnotes 196-197.

²⁵⁰ One of the examples of these ‘pulse images’ is referenced in Figure 6 and Footnote 198 of Chapter Three. It should be noted that there is a variance of opinion on this as the early Chinese text mentioned in Footnote 198 refers to there being ‘forty-eight pulse images,’ whereas many contemporary texts refer to there being twenty-seven or twenty-eight waveform images, such as in these texts: Xu, et al., 2008, p. 178; Flaws, 1995, p.19.

²⁵¹ Anthropologist Judith Farquhar has written a comparative analysis on the use of ‘pulsometers’ in contrast with traditional CM pulse analysis within the context of contemporary CM clinics in China. Farquhar's article examines the socio-political reasons for using pulsometers, such as the aim to ‘modernise’ CM pulse diagnosis by using the pulseometer to provide an ‘objective’ standardised form of CM pulse analysis. Yet in practice, the pulsometers did not yield significant benefits to practitioners or patients, and overall, contemporary CM clinics preferred the qualitative embodied methods of pulse reading to standardised readings. See Farquhar, 2014, pp.23.

13). From each position, the practitioner registers at least two levels from which the pulse waveform qualities can be felt and are referred to as 'superficial' and 'deep.' This makes a total of twelve loci of palpation altogether for the pulse. Each locus or position is associated with specific *zàng-fǔ jīng-luò* such as: the Lungs, Large Intestine, Stomach, Spleen, Heart, Small Intestine and so on.²⁵² Each *zàng* and *fǔ* position corresponds to a lexicon of both pathological and ideal pulse waveform 'images.' For example, at the middle position on the left wrist (the position of the Liver and Gallbladder *zàng-fǔ* pair), there is a list of corresponding images, e.g., 'bowstring,' 'choppy,' 'replete,' 'fine,' and these waveform images – given their amplitude and vibratory quality – reveal the state of health of the *zàng-fǔ jīng-luò* (see Flaws, 1995, pp.64-66).

Right Hand



Left Hand

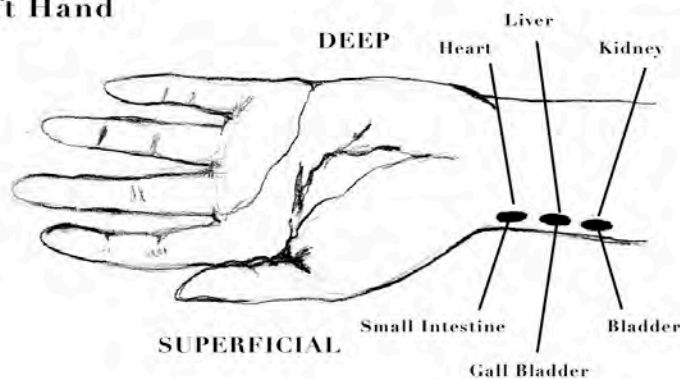


Figure 12: *Chinese Pulse Diagnosis Diagram* (2013). [Illustration] © Michelle Lewis-King.

During the performance itself, each pulse analysis is recorded through producing a set of case-study notes of clinical impressions based on CM therapeutic principles (see Figure 14). During the pulse consultation, rather than just writing standard medical notes and impressions (such as the person possesses a 'slippery' pulse at the Spleen/Stomach

²⁵² To review discussion of the *zàng-fǔ jīng-luò* see Chapter Three, pages 71-75.

positions) and only spending three to five minutes analysing a pulse (as is standard CM clinical practice due to time constraints), I spend at least twenty minutes reading each participant's pulse in order to produce a hand drawn graphic notation of each unique *zàng* and *fū* waveform that emerges. This notation is then given to every participant as a record of the encounter and as an artwork that is created uniquely from and for them.

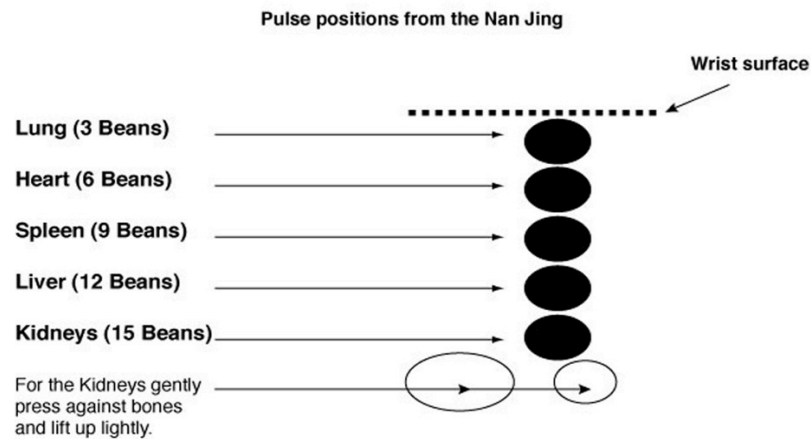


Figure 13: *Nanjing Pulse Diagram* (2013). [Diagram] © Michelle Lewis-King.

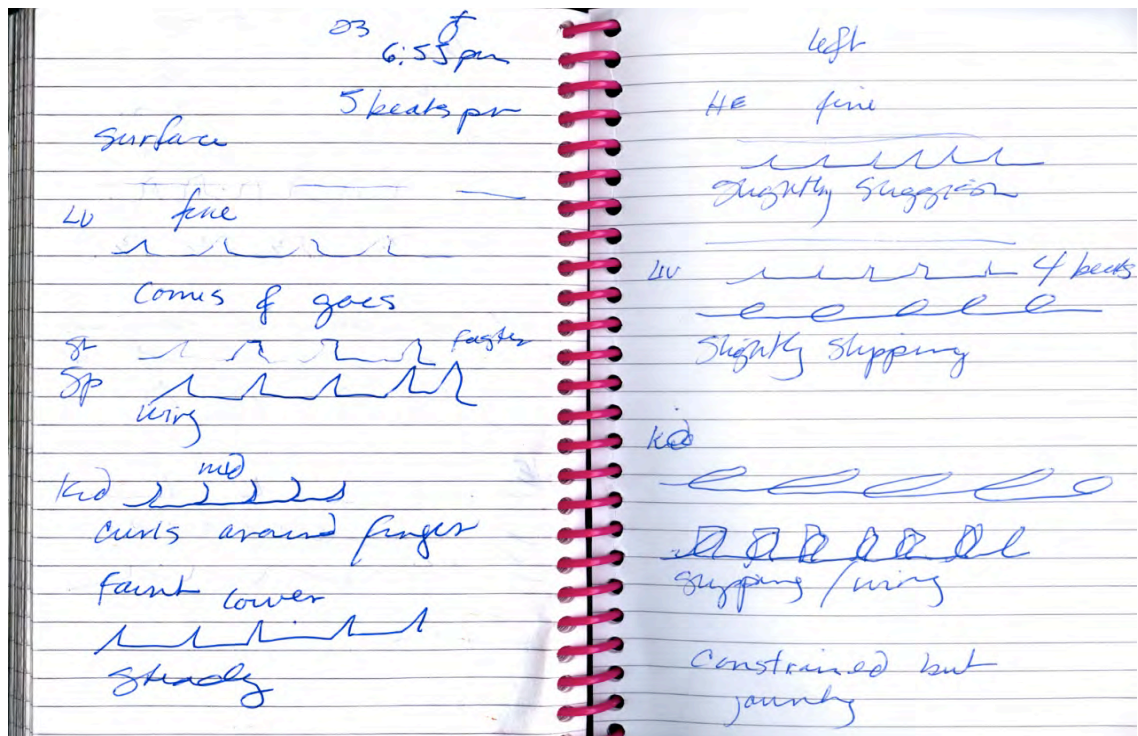


Figure 14: *Clinical Notation* (2011). [Photo] © Michelle Lewis-King. Photo: Barbara Butkus.

The Notation Process²⁵³

As mentioned above, each notation is produced as a document that offers a live translation of a participant's internal *zàng-fǔ* cosmology via pulse analysis (see figures 15 - 18).²⁵⁴ These notations form a record of the circuit between others and myself – as an inscription of the moment of my breathing (and their breathing), of touching (and their being touched), of listening (and their being listened to), of interpreting and responding (and their being interpreted and responded to). The notations are also a crucial aide memoire to the composing process as each of the lines within the notations serves to remind me of the somatic sensations and psychic impressions felt within the pulse. The strength and weakness of each line in the notation informs the amplitude of sine waves that correspond to particular *zàng-fǔ jīng-luò* within the soundscape compositions. These notation inscriptions describe more than just clinical 'data,' as I perceive/intuit something about each person from the moment of being literally 'in touch' with them. This 'something' can be an image that suddenly arrives in my mind or a suggestion of a particular musical signature or cadence. These extra impressions assist me in my meditation on each person as a unique symphony of embodied being.

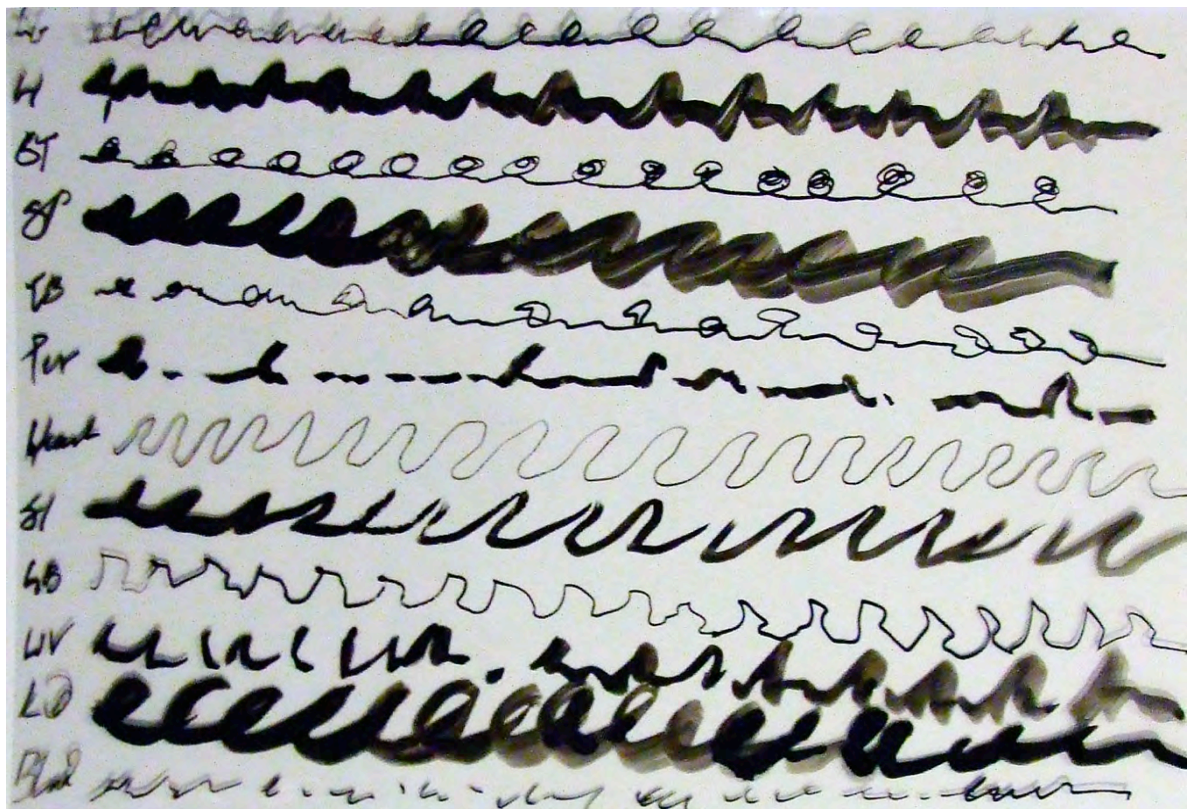


Figure 15: *Cambridge Notation 1* (2014). [Ink Painting on Acetate] @ Michelle Lewis-King. Photo: Léna Lewis-King. Dimensions: 18 x 30 cm.

²⁵³ This section is a rewritten excerpt of a previously published text. For the original text, see Appendix II, page 235.

²⁵⁴ There are more examples of pulse notations in Appendix IX.

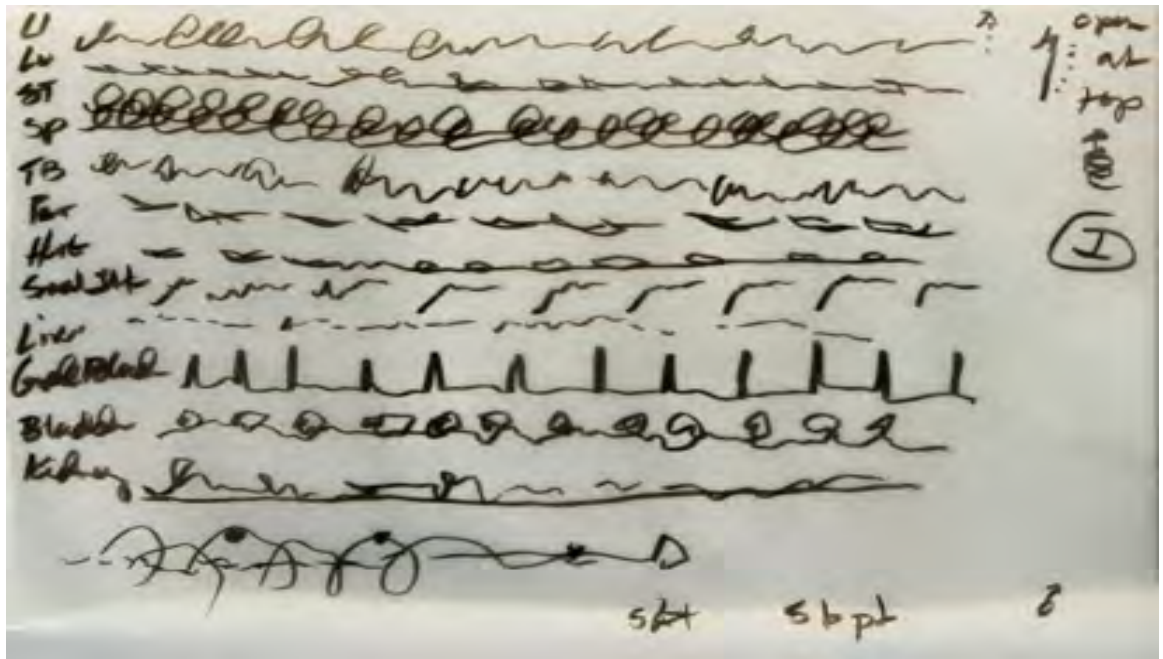


Figure 16: *Hastings 2* (2015) [photo] © Michelle Lewis-King. Tracing Paper, Ink. Photo: Léna Lewis-King. Dimensions: 18 x 30 cm

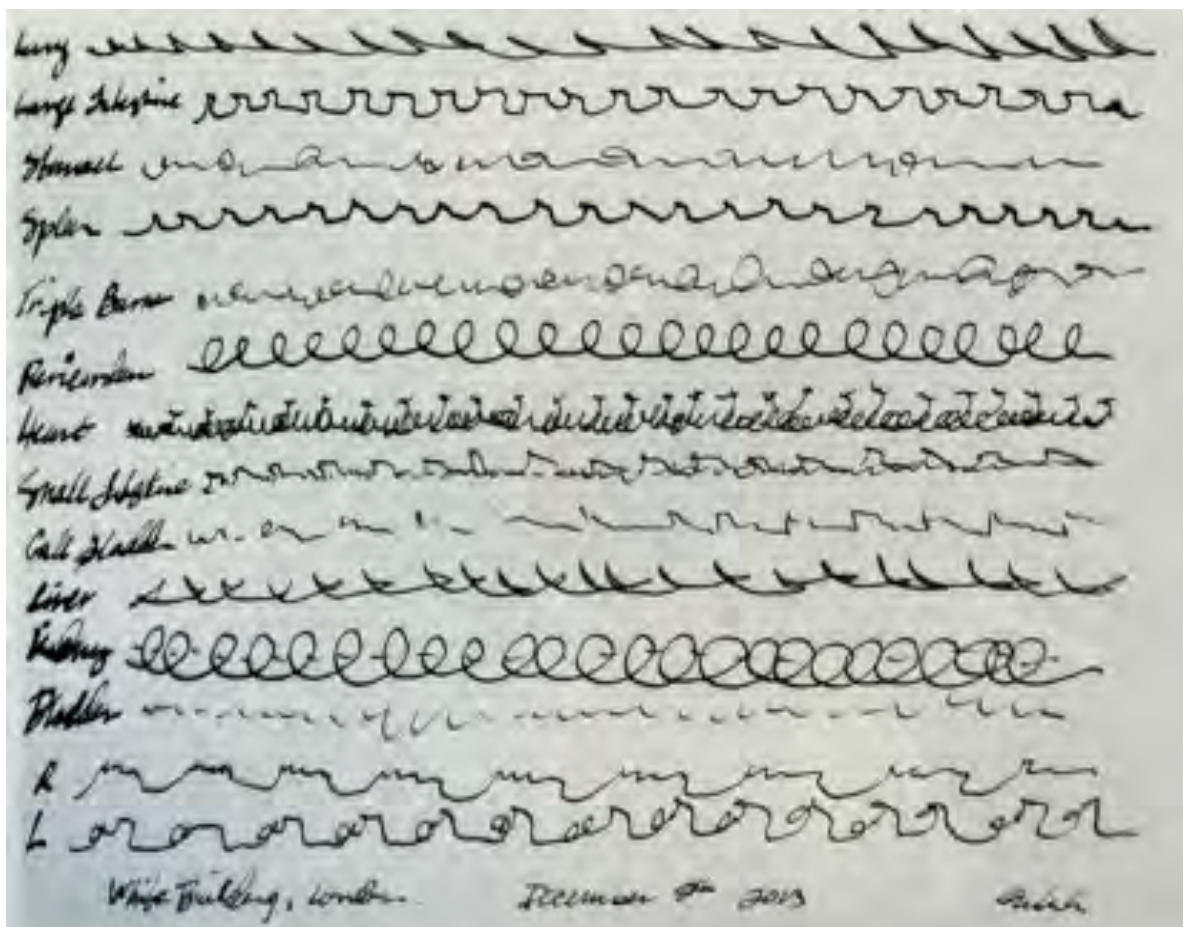


Figure 17: *White Building 4* (2013) White Building, London. [photo] © Michelle Lewis-King. Materials: Acetate, ink. Photo: Léna Lewis-King. Dimensions: 18 x 30 cm

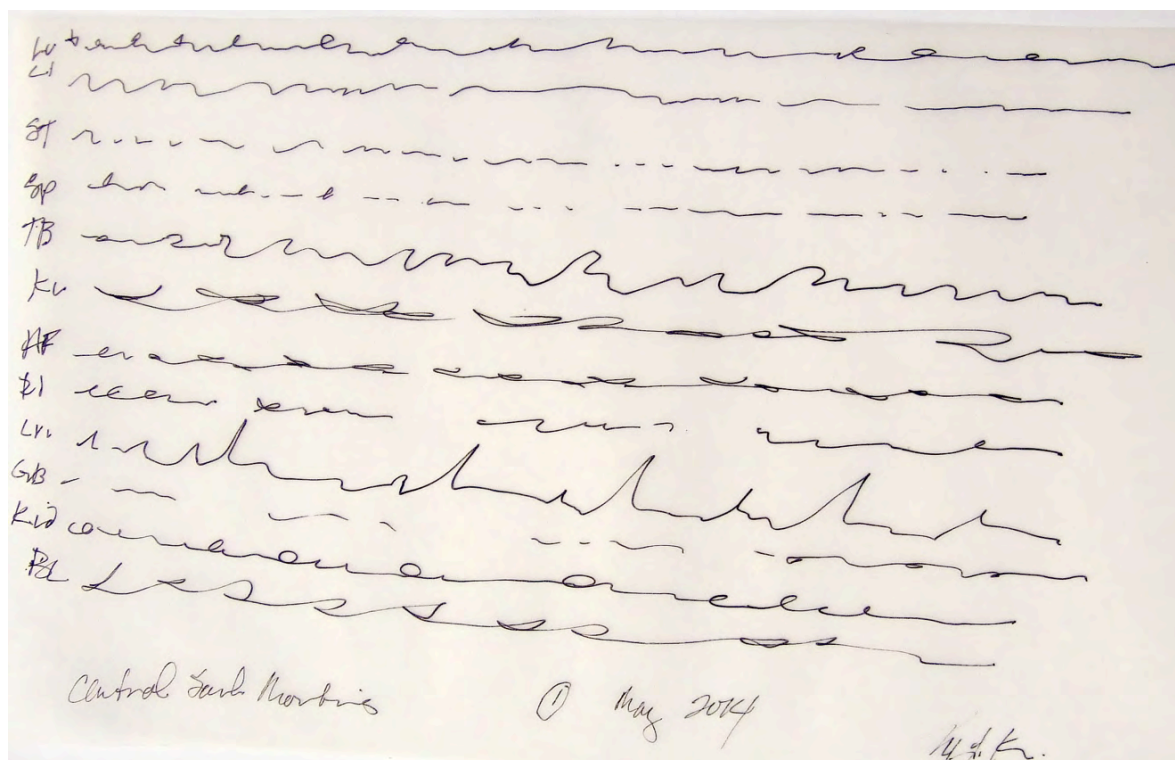


Figure 18: Central Saint Martins Notation 1 (2014) [ink drawing] © Michelle Lewis-King. Photo: Michelle Lewis-King. Dimensions: 18 x 24 cm.

With these notations I use my embodied perceptive consciousness (*yi*) to produce knowledge of others' bodies as a challenge to the modern scientific view that mechanical production of knowledge of the body is more 'legitimate' than embodied (human) knowledge production (see Daston and Galison, 2007, pp.88, 98). *Pulse Project's* hand-drawn notations are created in contrast to the body as represented by x-rays, computed axial tomography (CAT) scans and medical records (inscriptions), not only because my notations represent how the body *sounds* and *feels* rather than how it *appears*, but also because *Pulse Project's* notations materialise the production of scientific knowledge by using the body as a medico-artistic technology, i.e., through using diagnostic touch (this draws on my medical training and experience) and the artist's hand²⁵⁵ (this draws on my training in fine art and aesthetics) together to assess and represent the body as a temporal, multidimensional and relational entity – instead of simply as a discrete mechanico-physical object.

Daston and Galison (1992) discuss the disdain for human interference in the process of producing scientific images of nature and science's inclination toward the mechanical over the organic (which was especially characteristic of late eighteenth and nineteenth century

²⁵⁵ Here I refer to Daston and Galison's discussion of the artist's hand as it was used under the scientist's trained judgment to create objective imagery of the natural world as rational and perfected (see Daston and Galison, 2007, p.88) - as opposed to an artist producing an image of nature without the cognitive direction of the scientist - which would produce a 'distortion' of nature through the agency of human error (see Daston and Galison, 2007, p.77).

science) in the following passage:

‘At issue was not only accuracy but morality as well: the all too-human scientists must, as a matter of duty, restrain themselves from imposing... on the image of nature. Wary of human intervention, [leading scientists] turned to mechanically produced images to eliminate suspect [human] mediation.’ (Daston and Galison, 1992, p.81)

Daston and Galison thus reveal the hidden *human* desires that underpin the production of scientific images, such as emotional and physical detachment and ‘recourse to quantification’ (Daston and Galison, 2007, p.29) – particularly the notion that mechanical and automatic forms of objectivity offer a more ‘virtuous’ or ‘ideal’ method for producing images of nature (see Daston and Galison, 2007, pp.28-42).

Philosopher of science Bruno Latour addresses this theme of producing scientific (objective) images of nature within the context of the clinic and laboratory through the concept of the ‘inscription.’ Latour (1999) defines inscriptions as: ‘a general term that refers to all types of transformations through which an entity becomes materialised into a sign, an archive, a document, a piece of paper, or a trace. Usually but not always inscriptions are two-dimensional, superimposable, and combinable’ (Latour, 1999, p. 311). Latour’s description alludes to producing scientific objectivity through reliance on the disembodiment and depersonalising processes of detachment, signification and mechanical reproduction. Latour further argues that scientific inscriptions do not represent a ‘mimetic process’ (a copy) in describing a subject. Instead, they are more concerned with the ‘compression’ and ‘transubstantiation’ of data that substitutes or ‘[takes] the place of the original situation’ (Latour, 1999, p.67). In other words, scientific inscription creates its own systematic code of representation, rather than offer a ‘true’ reproduction of nature.

These discussions above share a correspondence with my personal experience of working with the complexity of human being and being-withness in the clinic under the constraints of evidence based medicine, where clinical significance and effectivity are determined by reliance on mechanistic methods that detach the medical body from the ‘noise’ of the body’s entangled relationships with the lifeworld (this includes spiritual and emotional experience). In response to this dilemma, *Pulse Project* notations give shape to the hidden dimensions of human experience by using the ‘artist’s hand’ to produce new medical significances. In a reverse logic to the scientific inscription process described by Latour above, *Pulse Project* notations use human touch to materialise the imperceptible interfaces that exist between subject and object, body and lifeworld.

This approach to notation also aligns with Jones’s and Galison’s (1998) discussion on the intersectionality between art and science and the ways in which artistic and scientific images can be used as interfaces between these ‘binary economies’ (see Jones and Galison, 1998, p.6) to ‘shed [new] light on multiple philosophical and historical issues’

(p.3). These notations ask – as Jones and Galison ask – ‘How do images shape body knowledge?’ (Jones and Galison, 1998, p.10) by visually materializing a form of ‘body knowledge’ production that has been de-legitimized by Enlightenment science and colonialism (see Jones and Galison, pp.10-11; Schiebinger, 1998, pp.140-141).

Subsequently, *Pulse Project*’s pulse notations offer a new-old method for producing medical meaning by capturing intuitive impressions of embodied experience that adapt ‘traditional’ Chinese diagnosis together with contemporary art inscription techniques. This both extends the qualitative methodological approach to diagnostic analysis and produces transdisciplinary knowledge via the development of image interfaces that visually integrate artistic and medical practices into new and unique articulations of ‘body knowledge.’²⁵⁶

The Composing Process²⁵⁷

This project produces several layers of arts practice-based outputs that are woven together into an overall composition.²⁵⁸ The first output layer is represented by the performances, during which I take case histories, analyse pulse impressions and produce graphic notations. The second layer is represented by the translation of the notations into a digital language of commands, e.g., to create soundscapes as a list of sound ‘objects.’ The last layer is represented by the playback of soundscapes, which are produced either as headphones pieces or as multi-channel sound installations.²⁵⁹

As mentioned briefly in the introduction to this chapter, I use SuperCollider²⁶⁰ to create my soundscapes. One of the most unique features of SuperCollider is that its programming language can create live audio-visual environments with a rich array of sounds, text and images. However, producing interpretations of people’s pulses requires time to both reflect upon the unique significances of each pulse reading and also to have the ‘mental space’ to match the characteristics of each pulse notation with specific sine waves or sound ‘shapes’ in SuperCollider. So whilst composing clinical notations and graphic notations occurs ‘live’ (during the performance), the process of composing each

²⁵⁶ This is Schiebinger’s term (1998, p.140) for experiential knowledge of the body, which I refer to in the previous paragraph.

²⁵⁷ This section is a rewritten excerpt of one of my previously published articles. See Appendix II, pages 229-230.

²⁵⁸ These multiple layers of composing also describe a process of intermediality – this concept is discussed in relation to *Pulse Project* in the section titled: ‘Findings and Implications’ in the Conclusion.

²⁵⁹ The multichannel installations are described in more detail in the section entitled ‘Biomusic, Aural Architecture and *Pulse Project*’ in Chapter Five.

²⁶⁰ For more information on SuperCollider see McCartney, 2002. Also see: SuperCollider, n.d., n.p.

algorithmic composition takes place in my studio (some compositions even take a couple of months to produce). Moreover, SuperCollider's programming language enables me to sculpt with sound because it allows me to specify the shape, pitch, tempo and dynamic range of each sound object to match the individual lines demonstrated in the graphic notation (refer to the examples of Figures 14 - 18).²⁶¹

My approach to the composition process is informed by 'treatment strategy' and 'prescription' functions of the CM clinical encounter. Each of the frequencies, amplitudes and wave forms selected as part of the composition process, e.g., 'saw-tooth,' 'triangle' and 'square' sine wave objects are informed by analysing pulses in relation to the therapeutic principles of CM and traditional Chinese music theories (this is explained further in the next section). In addition to being an artistic interpretation of both a person's pulse (as a portrait that is sculpted in sound) and the clinical encounter, these soundscapes are composed to describe a 'thinking-as-caring.' Instead of responding to each person's pulse quantitatively, i.e., as a set of frequencies, waves and rhythms, I meditate upon each person's pulse qualitatively – as a considered, playful and therapeutically affective response to the emergent life of each person and to their act of generosity in offering to become participant-subjects of this study.

An Introduction to Chinese Medicine and Music Theories²⁶²

This section reviews the CM concepts outlined in Chapter Three as a means for demonstrating how I apply CM theory to the SuperCollider composition process. According to the *Huáng Dì nèijīng*,²⁶³ there are five *yīn*²⁶⁴ *zàng* organs: the Spleen, Liver, Heart, Lung and Kidneys, and six *yáng*²⁶⁵ *fǔ* organs: the Stomach, Gall Bladder, Small Intestine, Large Intestine and Urinary Bladder (see Unschuld, 1986, p.408). Each of the *zàng* and *fǔ* organs possess an associated energetic network, or 'channel' that runs between the depths of the organ to the outer reaches of the body (see Unschuld, 1986, p.408). As an organ that encloses the Heart, the Pericardium is regarded in Chinese Medicine as the 'Heart Protector' and is subsequently thought of as an additional organ of the Heart *zàng* (see Unschuld, 1986, p.312). So, when we include the extra *yīn* Pericardium organ-network, altogether the *zàng-fǔ* organ-network pairs create a total of six *zàng-fǔ jīng-luò yīnyáng* pairs and/or twelve (single) *zàng-fǔ jīng-luò* (see Figure 19).

²⁶¹ For an index of selected *Pulse Project* SuperCollider algorithmic compositions, please see Appendix XI.

²⁶² This is a rewritten excerpt of one of my previously published articles. See Appendix II, pages 237-239.

²⁶³ See Footnote 197 for commentary on this text.

²⁶⁴ See the Glossary in Appendix I for this term.

²⁶⁵ See the Glossary in Appendix I for this term.

Human body meridians

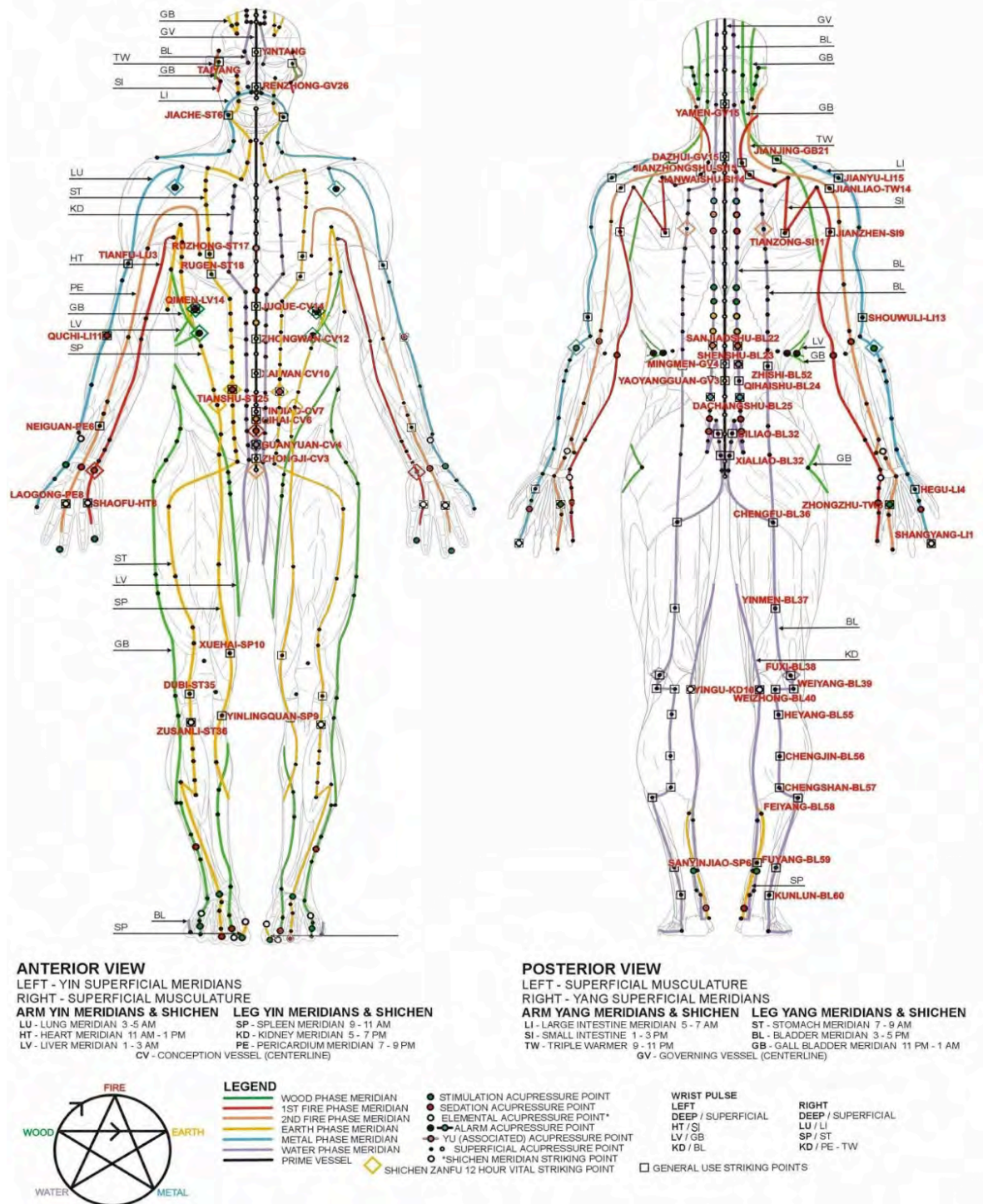


Figure 19: *Human body meridians* (2010). [digital image]. Author: KVDP. Creative Commons Attribution-Share Alike 3.0 Unported license. Source: Wikimedia Commons.²⁶⁶

²⁶⁶ This diagram demonstrates a contemporary overview of the twelve *zàng-fǔ jīng-luò*. Each *zàng-fǔ jīng-luò* pair is signified by the coloured lines on the body. The *jīng-luò* are: Lung, Large Intestine (blue lines), Stomach, Spleen (yellow lines), Heart, Small Intestine (red lines), Kidneys, Urinary Bladder (grey lines), Triple Heater, Pericardium (orange lines), Liver, Gall Bladder (green lines).

Since the twelve channels are perceived and analysed at the six points on the wrist where the *yīnyáng zàng-fǔ* pairs surface,²⁶⁷ consequently the twelve *zàng-fǔ jīng-luò* form the structural basis for my graphic notations and SuperCollider compositions.

Each of the *zàng-fǔ* pair networks is additionally associated with the phenomenal processes (as discussed in the 'Body Ecologic' section of Chapter Three) of the five elemental phases (*wǔxíng*): Fire, Earth, Metal, Water and Wood. For example, the Stomach/Spleen network is associated with Earth, the Lung/Large Intestine network is associated with Metal, the Kidney/Bladder network is associated with Water, the Liver/Gall Bladder network is associated with Wood, the Heart/Small Intestine is associated with Fire, the Triple Heater/Pericardium is associated with 'Ministerial' Fire. Furthermore, the *zàng-fǔ* pairs are likewise associated with the fundamental colours of their respective element: Fire is Red, Earth is Yellow, Metal is Silver/White, Water is Indigo/Black and Wood is Green (see Unschuld, 1986, p.256).

12	Ratios	Calculate	Calculate	Calculate	Calculate	Calculate	Calculate	Calculate	Calculate	Calculate		
Lǚ	Used for	from	from	from	from	from	from	from	from	from		
Names	Calculations	440.00	469.86	495.00	528.64	556.88	594.39	626.48	660.00	704.79	742.50	792.86
Huang Zhong	1/1	440.00	469.86	495.00	528.64	556.88	594.39	626.48	660.00	704.79	742.50	792.86
Da Lǚ	2187/2048	469.86	501.75	528.60	564.52	594.67	634.73	669.00	704.79	752.63	792.89	846.67
Da Cu	9/8	495.00	528.60	556.88	594.73	626.48	668.68	704.79	742.50	792.89	835.31	891.97
Jia Zhong	1968/1630	528.64	564.52	594.73	635.15	669.07	714.13	752.70	792.97	846.79	892.09	952.59
Gu Xian	81/64	556.88	594.67	626.48	669.07	704.79	752.27	792.89	835.31	892.01	939.73	1003.46
Zhong Lǚ	1771/1311	594.39	634.73	668.68	714.13	752.27	802.94	846.30	891.58	952.09	1003.46	1071.06
Rui Bin	729/512	626.48	669.00	704.79	752.70	792.89	846.30	892.01	939.73	1003.51	1057.19	1128.90
Lin Zhong	3/2	660.00	704.79	742.50	792.97	835.31	891.58	939.73	990.00	1057.19	1113.75	1189.29
Yi Ze	6561/4096	704.79	752.63	792.89	846.79	892.01	952.09	1003.51	1057.19	1128.95	1189.34	1270.01
Nan Lǚ	27/16	742.50	792.89	835.31	892.09	939.73	1003.03	1057.19	1113.75	1189.34	1252.97	1337.95
Wu Yi	5905/3277	792.86	846.67	891.97	952.59	1003.46	1071.06	1128.90	1189.29	1270.01	1337.95	1428.70
Ying Zhong	243/128	835.31	892.01	939.73	1003.60	1057.19	1128.40	1189.34	1252.97	1338.00	1409.59	1505.19
		Yu scale on Huang Zhong base freq.		Shang on Da Cu base freq.			Gong scale Zhong Lǚ base freq.			Jue scale on Yi Ze base freq.		Zhi scale on Wu Yi base freq.

Figure 20: *Chinese Music and Gamut and Scales* (2013). [Digital Image] Author: Moran, Patrick Edwin. Creative Commons Attribution-Share Alike 3.0 Unported license. Source: Wikimedia Commons.²⁶⁸

²⁶⁷ See Hsu, 2010, pp.179-180 for commentary on the 'inch openings' of the body where the pulse of the *zàng-fǔ jīng-luò* emerge and can be felt.

²⁶⁸ This image has various authors. For a full account refer to the reference section. This image shows the frequency tunings for the pentatonic tones: *gōng*, *shāng*, *jué*, *zhǐ*, *yǔ* that I use in my compositions.

Lastly, each element is also associated with a fundamental musical tone from the traditional Chinese pentatonic scale: *gōng*, *shāng*, *jué*, *zhǐ*, *yǔ*. The frequencies used in my SuperCollider compositions are therefore calculated using these traditional pentatonic tones (see Chen, 1996, pp.44-48) (see Figure 20). A more detailed explanation regarding the significance of the pentatonic pitches and their relationship to the *zàng-fǔ* is discussed in the next section.

Soundscape Composition²⁶⁹ as a Healing Modality²⁷⁰

In SuperCollider (SC), audio compositions are produced by writing a script of audio ‘object-oriented class arguments’ (McCartney, 2002, p.61). Each audio object exists within a schema of class relations that have their basis in the Boolean logic, e.g., true-false hierarchy relationships.²⁷¹ In his article ‘Algorithmic Composition: Computational Thinking in Music,’ Edwards (2011) argues that formal logic – as a system that organises binary movements between indeterminate and determinate musical thematic structures – has existed within music composition throughout Western history (see Edwards, 2011, p.58). I argue that these binary musical structures mentioned by Edwards represent the formalisation of the divided thinking that has characterised the continua of modern Western reason (as previously discussed in chapters two and three).²⁷² This binary logic fundamentally differs from the logic of Chinese metaphysics with its adherence to the interdependent, cosmological and process-oriented model of causality, e.g., *yīnyáng wǔxíng*. For this reason, I use the complex process-based logic of *yīnyáng wǔxíng* in my algorithmic compositions as a method for creating communication between contemporary Western programming logic and traditional Chinese musical and philosophical systems – an activity that in turn develops a cross-cultural and cross-temporal form of sonic knowledge production.

Moreover, my use of SC programming language (*sclang*)²⁷³ is unique because rather than producing sound purely from creating logical arguments and definitions, my use of *sclang* intensifies its focus on *listening* as the determining factor for composing each

²⁶⁹ To listen to a selection of *Pulse Project* soundscapes, please refer to the digital audio files that accompany this thesis and the ‘List of *Pulse Project* Soundscapes’ on page 343.

²⁷⁰ This section is a rewritten excerpt of one of my previously published articles. See Appendix II pages 238-239 for the original text.

²⁷¹ See Singh and Malhotra, 2012, p.330 for a description of class arguments in object oriented programs.

²⁷² Here I refer to the discussion on the mind/body paradigm discussed on pages 42-43.

²⁷³ See the Glossary in Appendix I for a definition of this term.

soundscape. *Sclang* is used to ‘sculpt’ the dynamics of each sine wave by reworking pre-existing SC sound-object arguments (contained within the SC *scsynth*²⁷⁴ library and SC tutorial files)²⁷⁵ by ‘ear,’ i.e., by listening to each audio object and adjusting it towards how it should ‘sound’ according to the notation. In this way, the embodied perceptive and intuitive aspects of listening *lead* my approach to composing sound (rather than adopting cognitive logic to lead the process).

To translate the waveforms of the body according to CM theory into sound, I conceive of sound in its basic essence - as a sine wave. Each sine wave is modulated to exemplify the signature qualities and fluid-like nature of the pulse waveforms as they are drawn in the notations. For example, the command ‘{SinOsc.ar(262.dup, mul: LFNoise2.kr(3, 3).max(0) * 0.009)}.play’ corresponds to a pulse emitting a ‘fine, slow and irregular’ oscillation along the Spleen channel. Since the *gōng* tone (at the frequency of 262 Hz) corresponds to the Spleen and Stomach networks (see Kim, Jeung and Lee, 2004, p.227), it is used in my composition to both represent and ‘boost’ the energy of the Earth *zàng-fǔ jīng-luò*. The *gōng* pitch is associated with the Earth *zàng-fǔ* because this pitch/frequency is considered to be the most therapeutic tone/vibration for the ‘Earth’ *zàng-fǔ* network according to CM theory (see Kim, Jeung and Lee, 2004, p.227).²⁷⁶

Pulse Project compositions are constructed to mirror the impressions of an individual’s pulse reading. Additionally, therapeutic aspects are added to the composition specific to what the individual’s pulse indicates they require according to CM principles. So whilst I do not perform a diagnosis in the biomedical sense in my performances, I do perform a diagnosis and treatment strategy in the CM sense. By drawing upon my experience as an acupuncturist, each soundscape forms a response to perceived imbalances in participant’s pulses. Subsequently, all *Pulse Project* compositions use pulse analysis to promote the health and well-being of participants by creating soundscapes that harmonise and rebalance of the overall pitches and waveform amplitudes of each participant’s *zàng-fǔ jīng-luò* (see Gao, et al., 2006, pp.764-765). According to the medical theory of the *Huang Di neijing*, the ‘ideal’ pitch²⁷⁷ of each of the *zàng-fǔ*, i.e., the pitch at which the organ network ideally oscillates at and responds best to are as follows:

- Heart/Small Intestine [*Zhǐ* - Fire pitch: 399 Hz]
- Spleen/Stomach [*Gōng* - Earth pitch: 264 Hz]

²⁷⁴ See the Glossary in Appendix I for a definition of this term.

²⁷⁵ The library and tutorials are contained within the SC software package and can be accessed through searching the SC menus whilst using the programme to compose.

²⁷⁶ For a basic explanation and break-down of the logic of SuperCollider code, please refer to Appendix X for an example.

²⁷⁷ See also Li, 2004 [circa 1245], p.230 for a discussion on how bamboo pipes were used to produce and measure the ‘five pitches.’

- Lung/Large Intestine [*Shāng*- Metal pitch: 295 Hz]
- Kidney/Bladder [*Yǔ* - Water pitch: 440 Hz]
- Liver/Gall Bladder [*Jué/Jiao* - Wood pitch: 350 Hz]

(see Lui, et al., 2010, p. 2006; Kim, Jeung and Lee, 2004, p.227).

Therefore, selecting the appropriate pitches for each participant is based on my assessment of both specific and overall characteristics of the twelve organ-networks within their pulse. The process of formulating a sonic ‘prescription’ is subsequently informed by and reflective of my clinical acupuncture practice.²⁷⁸

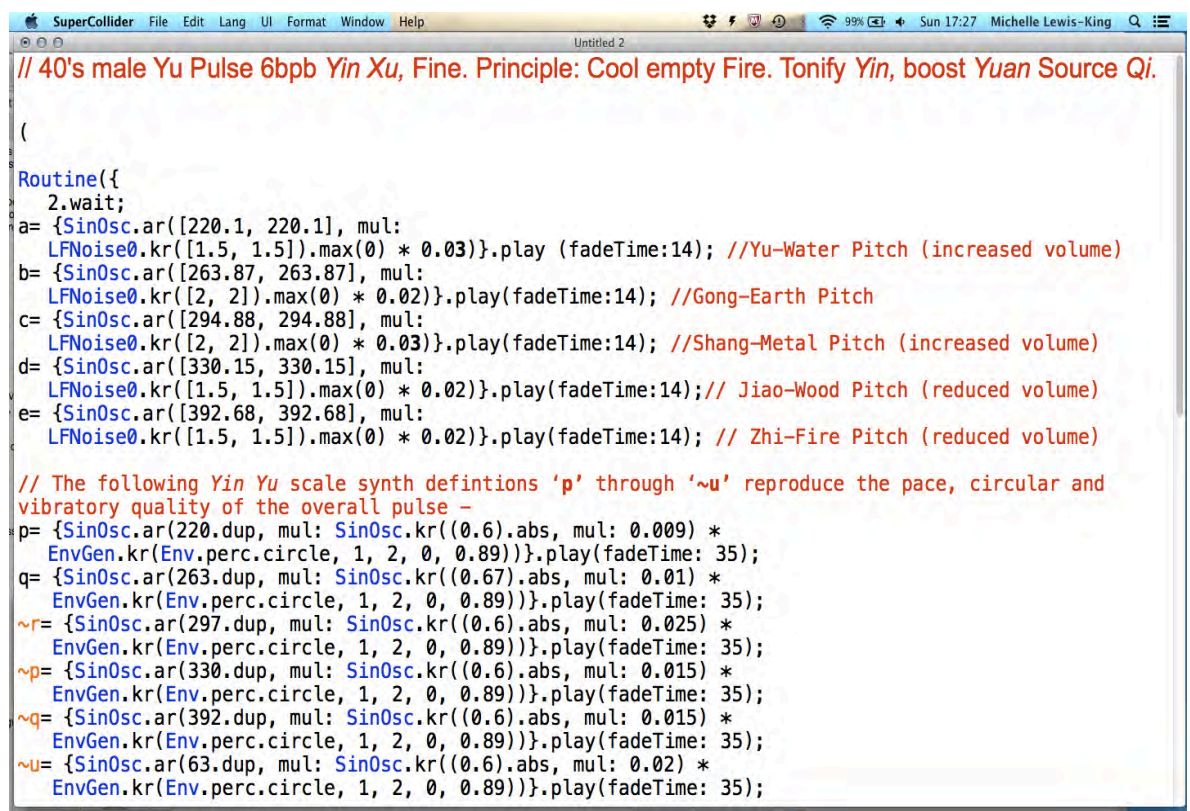


Figure 21: 40s Male Yǔ [Water] Pulse. Yīn Xu Fine. Cool Empty Fire, Boost Yuan Source Qì (2014). [Screenshot of SuperCollider code] © Michelle Lewis-King.²⁷⁹

Each composition is also titled according to the diagnostic characteristics of participants' pulses according to CM principles. For example, a composition created for a man in his mid-forties is titled as: *40s male. Yǔ [Water] Pulse. Yīn Xū, Fine. Treatment Principal: Cool Empty Fire. Tonify Yīn, Boost Yuán Qǐ*. In this participant's reading (refer to Figure 21), a very fine and rapid quality was felt on the Kidney Yīn position of the pulse.

²⁷⁸ In acupuncture practice, a prescription signifies the selection of acupuncture points that would be needed to either amplify or reduce the qì dynamics in the *zàng-fú jīng-luò* as discussed on pages 80-82.

²⁷⁹ The increases and reductions of amplitude (volume) of the pitches (Water, Fire, and so on) and the design 'shape' of the sine waves are demonstrated in Figure 21. Also see Appendix XI for other compositions demonstrating the amplification and reduction of tones.

This ‘weak’ Kidney *Yīn* quality was contrasted by an overly strong, percussive and rapid quality felt in the Gallbladder position. To create a sonic composition that would harmonise the overall pitches of the *zàng-fǔ jīng-luò*, the pulse impressions indicate that boosting the Water pitch, decreasing the Wood pitch and slowing the pace of entire the composition down would all benefit this individual. The Water element (*Yǔ*) with a pitch of 220 Hz (to resonate with Kidney *Yīn*)²⁸⁰ was considered to be the most beneficial tone for this individual overall and therefore forms the fundamental pitch with which to tune the pentatonic scale of this composition. The pitches/frequencies of each *zàng-fǔ jīng-luò* within each composition are amplified or diminished order to balance the ‘Five Tones’ of the pulse (Gao, et al., 2006, p.764). For example, the composition in Figure 21 adopts a *Yīn Yǔ* scale to reiterate and enhance the overall *yīn* aspect of the pulse, which was felt to be low.²⁸¹

Pulse Project: Instrumentation Processes²⁸²

I use SuperCollider (SC) to organise my soundscapes into multi-channel installations as it allows me to design individual layers of sound as well as to give each sound layer a directional path within a given space by moving (panning) the sounds to and from particular speakers. SC plays each composition by systematically evaluating lines of code. Each sound object is ‘streamed’ in real-time via a local SC server – a process that occurs through programming each SC line of code into a routine or sequence that communicates a series of commands. This involves the scheduling of sound objects to be played at specific times, for certain durations and at specified amplitudes. The server responds to this list of commands by systematically expediting them.²⁸³ For example, the *sclang*²⁸⁴ sound object ‘Routine’ notifies the SC server to evaluate each line of code in a queue of sequential patterns, from top to bottom (see Figure 22). Sounds can also be routed via program commands²⁸⁵ to specific speakers within a multi-channel speaker system (see Figure 23).

²⁸⁰ The pitch for Kidney *Yáng* is 440Hz.

²⁸¹ For further reading on the relationship between Chinese Medicine, music and health, see Chen, 2008, n.p.

²⁸² This section is a rewritten excerpt from a section in a previously published article. See Appendix II page 239 for the original text.

²⁸³ This process is referred to as ‘Real-Time Streaming Protocol’ (RTSP). For more information on this software engineering process within the context of streaming music and audio works, see Schulzrinne, et al., 2014.

²⁸⁴ See the Glossary in Appendix I for a definition of this term.

²⁸⁵ To view the method for sending sounds to speaker outputs, see the composition ‘Central Saint Martins 1’ in Appendix Xi pages 308-312 and search the composition for the word ‘outbus,’ which represents the command for assigning sound-objects to specific outputs.

```

SuperCollider File Edit Lang UI Format Window Help
Untitled 2

Routine({
  2.wait;

  a= {Resonz.ar(Dust2.ar(9), 264, 0.0009, 450) + //Spleen
    Resonz.ar(Dust2.ar(9), 528, 0.0009, 450) + //Stomach
    Resonz.ar(Dust2.ar(9), 296, 0.0009, 400) * 3.reciprocal; //Lung
  }.play(fadeTime:6, outbus:1);
  8.wait;

  b= {SinOsc.ar(freq: [263, 264], //Spleen - increased volume to boost qi
    mul: SinOsc.kr([1.9, 0.45], mul: 0.01).abs)}.play(fadeTime:25);
  c= {SinOsc.ar(freq: [294, 294], //Lung - increased volume to boost qi
    mul: SinOsc.kr([1.9, 0.45], mul: 0.009).abs)}.play(fadeTime:27);
  d= {SinOsc.ar(freq: [330, 330], // Liver - reduced volume to regulate flow of Liver blood
    mul: SinOsc.kr([1.9, 0.45], mul: 0.005).abs)}.play(fadeTime:27);
  e= {SinOsc.ar(freq: [440, 440], // Kidney Yin - increased volume and reduced rhythm
    to regulate original source qi (Yuan Qi)/also to use 'Water' to subdue 'Fire'.
    mul: SinOsc.kr([1, 0.2], mul: 0.006).abs)}.play(fadeTime:23);
  f= {SinOsc.ar(freq: [528, 528], // Stomach - increased volume to boost Stomach qi
    mul: SinOsc.kr([1.9, 0.45], mul: 0.01).abs)}.play(fadeTime:25);
  h= {SinOsc.ar(freq: [594, 594], // Large Intestine - increased volume to boost Large Intestine qi
    mul: SinOsc.kr([1.9, 0.45], mul: 0.009).abs)}.play(fadeTime:27);
  i= {SinOsc.ar(freq: [668, 668], //Gall Bladder - increased volume and reduced rhythm
    to consolidate Gall Bladder qi and regulate the flow of Liver Qi
    mul: SinOsc.kr([1.9, 0.45], mul: 0.008).abs)}.play(fadeTime:27);
  14.wait;

  j= {SinOsc.ar([264.69, 264.69], mul: LFNoise1.kr([2, 2]).max(0) * 0.009)}.play(fadeTime:22);
  k= {SinOsc.ar([296.27, 296.27], mul: LFNoise1.kr([2, 2]).max(0) * 0.008)}.play(fadeTime:22);
  l= {SinOsc.ar([330.95, 330.95], mul: LFNoise1.kr([1, 1]).max(0) * 0.005)}.play(fadeTime:22);
  m= {SinOsc.ar([395.17, 395.17], mul: LFNoise1.kr([1, 1]).max(0) * 0.008)}.play(fadeTime:22);
  n= {SinOsc.ar([440.69, 444.69], mul: LFNoise1.kr([1, 1]).max(0) * 0.008)}.play(fadeTime:22);

  10.wait;
}

```

Figure 22: *Routine* (2015). [Screenshot] © Michelle Lewis-King.²⁸⁶



Figure 23: *Multichannel Studio – Digital Performance Lab* at Anglia Ruskin University (2014). [Photo] © Michelle Lewis-King.

²⁸⁶ The routine evaluates from top to bottom, reading each argument (signified by a letter of the alphabet). '10.wait' means to run the code for the duration of ten seconds.

Pulse Project as Rhythmanalysis²⁸⁷

Philosopher Henri Lefebvre describes Rhythmanalysis (2004)²⁸⁸ as a mode of analysis that allows for an examination of being (ontology) as the confluence of space, time and energy. Of particular interest in relation to this project is Lefebvre's focus on adopting the body as both a eurythmic²⁸⁹ entity (see Lefebvre, 2004, p.16) and also as the primary instrument of (rhythm) analysis (see p.19). In writing *Rhythmanalysis: Space, Time and Everyday Life* (2004), Lefebvre's aim was to establish a successor science through creating a new and expanded analysis of rhythm. Lefebvre's theory of rhythm reconfigures the rhythmic interplay of space, time, energy and everyday life into a cross-disciplinary form of analysis that engages in both scientific and artistic modes of investigation. Lefebvre's multifaceted approach to investigating the complex processes of being-in-the-world is precisely the approach to analysis this project undertakes.

More particularly, the pulse readings, notations and sonic compositions so far discussed in this chapter materialise the temporal rhythmicity of the moment of embodied connection within each performance encounter as forms of 'rhythmanalysis.' *Pulse Project's* analyses not only examine the ontology of body/lifeworld rhythms via pulse analysis and also produce rhythmic soundscapes as additional and more concrete forms of analysis of this moment... this project also ethically produces sonic compositions that aim to enhance each research participant's wellbeing as an integral aspect of this

²⁸⁷ Conducting *Pulse Project* as 'rhythmanalysis' will be discussed again in Chapter Five, in the section 'Pulse Project in Relation to Sound Studies' and also in the last paragraphs of the Conclusion.

²⁸⁸ A theory on rhythmanalysis was first developed by the Portuguese philosopher L.A. Pinheiro dos Santos in *Ritmanálise* (1931). Goodman (2012) describes Pinheiro dos Santos's rhythmanalysis as: 'an ontology of vibration, where vibration at the molecular, or even deeper at the quantum, level constitutes the fundamental yet abstract movement of matter' (2012, p.85). *Ritmanálise* greatly influenced philosopher of science Gaston Bachelard's *The Dialectic of Duration* (1950), which was written as a critique of Bergson's universalist concept of duration. In his chapter 'Rhythmanalysis' (in *The Dialectic of Duration*), Bachelard contextualises Pinheiro dos Santo's discussion on rhythm within the field of quantum physics - writing that time, space and energy interact within temporal sequences of discontinuous patterns. Bachelard contextualises Pinheiro dos Santos's approach as the antithesis to Bergson's notion that time is continuous, unitary and calculable (See Goodman, 2012, pp.86-87; Chimisso, 2013, pp.122-123). Bachelard argued that the rhythm of psychological activity is also a crucial factor in perceiving and understanding time and space (see Chimisso, 2013, p.123). These texts and concepts on rhythm as developed by Pinheiro dos Santos and Bachelard formed the foundation of Lefebvre's subsequent developments of rhythmanalysis.

²⁸⁹ Lefebvre defines the eurythmic body as being: 'composed of diverse rhythms – each organ, each having its own function – keeps them in metastable equilibrium... But the surroundings of bodies, be they in nature or a social setting, are also bundles, bouquets, garlands of rhythms, to which it is necessary to listen in order to grasp the natural or produced ensembles.' (Lefebvre, 2004, p.20)

project's knowledge production. For example, Lefebvre writes that the rhythmanalyst:

'listens... first to his body; he learns rhythm from it, in order consequently to appreciate external rhythms. His body serves him as a metronome. A difficult task and situation: to perceive distinct rhythms distinctly, without disrupting them, without dislocating time.' (2004, p.19)

This paragraph describes the task of Chinese pulse analysis, as it is not simply a matter of listening to the body, but of listening to the body in symphonic relation to the alchemical unfolding of the world (as described in previous sections in this chapter). The most appropriate discussion of this process is in the section entitled: 'Zhéng as Matrixial Interface',²⁹⁰ which describes the ways in which the analyst not only needs to understand the multiple rhythms of the pulse to get an impression of the vibrational health or disharmony of the body, but he/she must understand these internal rhythms in relation to the external rhythms of the seasons, the rhythms of the person's domestic and professional life and the rhythms of genetic inheritance. This is why CM pulse diagnosis is a rhythmanalysis *par excellence*.

The health of the body (according to CM theory) can be determined through a profound understanding of rhythm via long-term study of pulse wave-images... each pulse-image-rhythm indicate either the robust activity of the organ-networks or their dysfunction and failure. Lefebvre writes on rhythmic wellbeing as a state created by the synchronised, 'metastable' organisation of multiple chains of rhythms, or 'eurythmia' (Lefebvre, 2004, p.67), whereas pathology is created by arrhythmia as bodily 'rhythms break apart, alter and bypass synchronisation' (Lefebvre, 2004, p.67). These eurythmic and arrhythmic patterns of the *zàng-fǔ* are exactly what the CM practitioner listens for and feels within the pulse.

Diverging from the strategies used in the CM clinic, e.g., selecting points and twisting needles to retune the infrasonic *qìscape* of the *zàng-fǔ*,²⁹¹ my strategy in this project is to create eurythmic soundscapes that resonate, both internally and externally, by tuning particular frequencies and rhythms to sympathetically relate to and resonate within and around participant's bodies. This strategy aims to decrease the arrhythmic patterns felt in participants' pulses and restores the body's equilibrium by enhancing the harmonic rhythmicity of the *zàng-fǔ*. Consequently, the pulse soundscapes of this project promote wellbeing by rhythmically harmonising the pulses of the *zàng-fǔ*; and at the same time, the soundscapes synchronise participants' internal organ-networks with their external environment. This approach to creating soundscapes-as-prescriptions is what Lefebvre refers to as 'intervention through rhythm... [that] has an objective: to strengthen or re-

²⁹⁰ See pages 76-77.

²⁹¹ These clinical techniques were described in Chapter Three, in the section: 'The Sculpting of Qi as Infrasound.'

establish eurythmia' (2004, p.68). This re-establishment of health through eurythmia is known as the body's healing response in CM.

Thus, *Pulse Project* develops a new approach to rhythmanalysis by using CM (as a science) and artistic methodology together to examine, interpret and create new harmonic rhythmic resonances both within the body and also between the body and the lifeworld... as the creation of a new eurythmic being-withness in the world.

The Peer Review Process

The process of presenting my research at various conferences, cultural events and publishing my work in academic journals has shaped the professional development of this project. For example, presenting *Pulse Project* performances and soundscapes at conferences provided fundamental means of disseminating this research by offering a professional platform for sharing and reflecting on the diverse processes of this research project, such as demonstrating and discussing the invisible and alchemical aspects of Chinese pulse diagnosis or playing the personalised soundscapes to wider audiences beyond the participants in this research. Additionally, presentations of *Pulse Project* at conferences (see Figure 24) provided me with many opportunities to receive highly specialised and knowledgeable peer feedback on the methods, approaches and reception of my research.

Overall, the peer review and feedback process of my research followed this sequence:

1. Initiating performances and producing artworks.
2. Contextualising the practice-based works via literature review and analysis.
3. Creating a synthesis of theory and practice through using the research writing process to weave together practice outputs with contextual literature.
4. Sending abstracts, papers and creative output documents for review by conference organisers, journal editors, professional peers and also participants of the research.
5. Receiving responses from peers (sometimes in the form of very detailed critical feedback as in the case of writing articles for journals) and from *Pulse Project* participants
6. Feeding these suggestions, comments and criticisms back into the next cycle of performances, papers, articles and soundscape compositions



Figure 24: 'Pulse Project Presentation' at *The Noises of Art Conference*, Aberystwyth University in Association with the Courtauld Institute, Wales (2013). [Photo] © Michelle Lewis-King. Image: John Harvey.

As an essential part of this peer-review and feedback process, *Pulse Project* has produced a variety of contributions in the form of publications and creative outputs²⁹² that are discussed here in an abbreviated summary. To test the contemporary relevance of *Pulse Project*, I continually submitted abstracts to journals and calls for research presentations. Abstracts that were accepted were subsequently peer-reviewed and developed into full-length articles or conference proceedings. During this process, I received critical feedback on the strengths and weaknesses of my articles with suggestions on how to improve certain sections. These articles then went on to be published in the following academic journals: *Technoetic Arts*, *The Acupuncturist*, *Digital Creativity*, the *Journal of Sonic Studies*, *ELSE Journal for Artistic Research* and *Reflections on Process in Sound*. Additionally, some notable exhibitions of *Pulse Project*'s creative outputs²⁹³ include: 'Drawing Towards Sound', at the Stephen Lawrence Gallery, University of Greenwich, *Pulse Project* at The Gallery, Shanghai, China (a solo show), 'Disjointed: Digital Culture' at the Ex-Teresa Museum in Mexico, 'Artists' Games' at Spike

²⁹² See Appendix III for a list of the creative outputs for this project. See also Appendix II, which contains my published manuscripts on this project.

²⁹³ Images of these exhibitions are in Appendix IV.

Island, 'Digital Futures' at the V&A Museum, and 'Show, But Also Tell' at the Anatomy Museum at Kings College. Some notable invitations include artist and curator Shulea Cheang, who invited me to develop a workshop based on my research at *infoCRASH@STWST48* alongside the *Ars Electronica Festival 2015* and 4DSOUND Institute for Spatial Sound, Budapest who invited me to collaborate with them in *TodaysArt NL 2015*.²⁹⁴

Participant Engagement and Feedback

The research participants' discussions and feedback provide important testimony for this project's ethical investigation of current art, science and technology (AST) practices. Additionally, the participant feedback offers a form of 'quality control' that enables an ethical evaluation of this project by providing external critical commentary on my conduct as a researcher and on my methodological approach during the performance encounter. The participant feedback²⁹⁵ in this project also provides a means for ethically including participants' hidden experiences and personal reflections as an important and integral aspect of this project's collaborative knowledge production process.

The feedback participants provided was very rich in discussion, with some discussions developing further into collaborations and the production of new creative works that exceeded the remit of this research. This section therefore only reflects upon the significant findings of *Pulse Project's* public exploration of current thinking on art, medicine and technology practices.

For the purpose of evaluating participant feedback, in this section I first describe the design of the performance study, which includes the following:

- The method by which participants were informed about their participation before and during the performance.
- The process of selection for composing the soundscapes.
- The method for gathering participant feedback and also for evaluating the results.

Feedback Methodology

At each performance, I provided participants with 'Participant Information Sheets',²⁹⁶

²⁹⁴ For further discussion of my work with 4DSOUND, see the section entitled 'Biomusic, Aural Architecture and *Pulse Project*' in Chapter Five.

²⁹⁵ To have a more complete sense of the ebb and flow between this project and the participant's creative responses and productions, please read the 'Participant Feedback Log' in Appendix VIII.

²⁹⁶ See Appendix VI for the Participant Information Sheets.

which explained the aims and objectives of the performance and also provided my contact details. Participants read this information and consented to the performance as a condition of taking part. As part of my ethics proposal²⁹⁷ to conduct this research, I decided that all participants' soundscapes and notations would be anonymised in the same manner as in social science case-study research to protect participants' identities. The location and sequence number of each participant was used to title each soundscape instead, e.g., 'Copenhagen 2.' During the performance itself, I gave participants a basic explanation of my approach to pulse analysis as well as rudimentary information on CM theory. As I completed each consultation, I informed participants they would need to contact me if they wanted a soundscape composed for them after the performance.²⁹⁸ After receiving requests from participants (and this request would sometimes be accompanied by a participant's feedback about the performance), I informed participants that it would be several weeks wait minimum for their soundscape. When each soundscape was completed, I sent participants their soundscapes accompanied by a feedback questionnaire. Participants, who were free to opt out at any time, were encouraged to respond as much or as little as they desired.

Results

Overall, thirty-five bespoke soundscapes were composed from the many performances conducted at various locations throughout the United Kingdom and across Europe between 2012 and 2016. Performance locations in the United Kingdom include: Leeds, Huddersfield, Glasgow, London (at various venues), Hastings, Cambridge and Reading. In Europe, locations included: Copenhagen, Berlin, Linz, Den Haag, Budapest and Venice.²⁹⁹ From the thirty-five participants who requested and received compositions, thirteen participants have provided feedback (this is representative of 37.14% of participants who received soundscapes). The questionnaire used to gather feedback provided a set of basic questions³⁰⁰ and was designed to be informal - making it as easy as possible for participants to respond. This approach allowed for feedback that ranged from simple sentences to complex responses.³⁰¹ In terms of quantitative measures, the responses were: ten positive, one negative, one neutral, and one neutral-positive - reflecting an overall 'positive' response to research participation. Interestingly, there is a

²⁹⁷ See Appendix V for the Ethics Proposal.

²⁹⁸ After the first performance in 2012, when I made compositions of each participant, only a few actually wrote to ask for their soundscape. As composing took considerable time, I subsequently limited the creation of compositions to only those who requested them.

²⁹⁹ See Appendix IX for details.

³⁰⁰ See Appendix VII.

³⁰¹ See Appendix VIII.

response divide between women and men in terms of participants offering critical (mainly men) or affirmative (mainly women) feedback, but this may be incidental.³⁰²

Some Key Responses

Commencing with the participant who had the most negative participation experience, although this participant (identified as 'Copenhagen 2') remarks that his soundscape is a 'lovely piece with some great tones,' he responds negatively overall to the blurred boundaries between art and science methodologies within both performance and composition processes and commented that he felt the performance to be: 'a little stilted. Because of your non-authoritative demeanour, I wasn't sure whether the performance was grounded in irony and humour, or serious academic work.'³⁰³ This implies that the intimacy of the encounter - without the distancing aspect of an 'authoritative demeanour' - was considered by this participant as confusing and perhaps grounds for questioning my authority to conduct a 'serious' academic work. Also, he finds the observational and substantive processes of drawing the notations preferable to the more esoteric aspects of the performance as he states: 'The drawing gave the participant an immediate representation of a novel experience – an art object created out of a pseudo-scientific experiment.' These statements overall seem to reflect a discomfort with the way in which art and medical science are combined and this is evidenced in the feedback by the participant's re-establishing the authorial boundary of science within the performance encounter by naming the 'notation' an art 'object' based upon a 'pseudoscience' (the performance concept). The art/medical-science framework for the soundscape was likewise perceived to be too ambiguous, as the participant states: 'I wonder if I am to read it as a diagnosis or a musical piece. If a diagnosis, then I do not have the sufficient knowledge to read it.' This raises an interesting question.

Within the scenario of being diagnosed as part of an artistic research-led performance, from what knowledge base is he to assess my diagnosis? In this situation, the pulse readings and soundscapes function as repurposed diagnoses and prescriptions and this 'playing with' the social function of these activities seems to produce a negative experience for some participants. Given some of the serious (potentially life-threatening) aspects that occur within standard clinical encounters, this reaction is understandable. Yet this reaction also arrives at the heart of what I am attempting to question in this research.

This feedback made me (ethically) reconsider how much a participant ought to know about a performance before taking part. Maintaining the balance between a playful yet

³⁰² This might provide some interesting directions for future research of gendered experience of AST projects.

³⁰³ See 'Copenhagen 2' in the Participant Feedback Log in the Appendix VIII, page 283.

serious exploration of the social relationships between art and medicine during the performance can be somewhat problematic, as the participant ‘Copenhagen 2’ makes clear. Therefore, to address and improve this dilemma within the performance-consultation, I refer to the practice of ‘building rapport’³⁰⁴ in the clinic by applying what I have learned from the commentary of each participant – reflecting upon this information and then feeding back this new understanding into the next performance encounter. This ‘feedback-amend’ process that is used to enhance the professional development of *Pulse Project* performances is one I have adopted from the ‘critical reflection’ process that takes place within clinical practice (see Fook and Gardner, 2007, pp.1-3). In this way, the method for reflecting on interpersonal dynamics learned in my clinical training and practice is used to inform my approach to artistic research. This process enables me to be more sensitive and respond more appropriately to research participants’ needs.

Feedback I have categorized as ‘neutral’ represents feedback that reflects expertise in music – since these participants’ questions mainly concern themselves with specialist issues such as appropriate use of musical terms, e.g., ‘tone’ and ‘frequency,’³⁰⁵ how I framed the listening process for the soundscapes, whether the soundscapes were ‘music’ or ‘sound,’ what I meant by ‘logic’ and so on.³⁰⁶ This ‘neutral’ group of participants’ concerns better informed my approach to conceptualising the sonic aspects of this study. Again, this pedagogical type of feedback shaped the participation process of the performance study into feedback ‘loops’ of further correspondence and inquiry. This group’s commentary affirm that this project was not simply an inquiry into art and medical science, but is also open to other areas of inquiry, such as questioning the boundaries between sound art and music.³⁰⁷ In seeing my soundscapes as sculpture but also as a sonic art that shares a qualitative boundary area with music, the dialogic process of critical feedback in this study challenges both participants and researcher to explore the outer edges of their own knowledge in order to ‘touch’ upon the knowledge of another... to renegotiate and expand one’s own knowledge through consideration of the thoughts of others.

Whilst relativism and lack of clarity can be a significant problem in a project that touches on converged areas of art, medicine and technology practice – in terms of testing

³⁰⁴ Within *Pulse Project*’s performances, I have adapted my experience of building rapport within the clinical encounter to function within an artistic methodology context. In this way, rapport-building converges both artistic and scientific approaches to medical investigation and also facilitates direct interpersonal communication with participants.

³⁰⁵ See ‘Copenhagen 9’ in the Participant Feedback Log in the Appendix VIII, pages 283-285.

³⁰⁶ See ‘Leeds 3’ in the Participant Feedback Log in the Appendix VIII, pages 285-286.

³⁰⁷ Musicologist Brian Kane also questions this ‘division’ between sound and music and argues that this a false distinction created by the aesthetic philosophies of ‘modernism and postmodernism.’ See Kane, 2013, n.p.

whether this project can be successfully communicated to participants during the performances in a manner that is clear but also engages their creative response – the best confirmation of this communication is given by this participant who writes:

‘Moreover, not every biological process taking place in our bodies is fully explained and understood even in “sophisticated” western medicine, so maybe searching for the new unconventional methods like you do leads us to understand our own species in a totally different way. Although pulse reading has long history and today it gives us lot of information about the functioning of some of our internal organs, your method is an amazing way to hear it in a way we never did... from beat to ambient music... it makes me think that my body has not only rhythm but also it's own, unique melody.’³⁰⁸

This response addresses precisely the reconsideration of the dominant cultural narratives surrounding embodiment and the clinical encounter that I have endeavoured to reconfigure through my performances and soundscapes. This feedback thus provides an external confirmation of this project’s research objectives, such as creating new awareness of what a body is and does, and also how current understanding of AST can be reorganised into new knowledge formations. Particularly as this participant notes that she can hear her body ‘in a way [she] never had before’ and that her body ‘has not only rhythm but its own unique melody,’ these statements give substance to the notion that artistic production can offer an enriching experience of the medical encounter.

Furthermore, what the feedback also significantly reflects is an overall enthusiasm for being touched, as these two participants put eloquently: ‘It felt very mysterious, as if you were reading an invisible, unknown aspect of my self;’³⁰⁹ or, ‘There is something liberating about being touched, about communicating without words or visuals.’³¹⁰ Although all participants comment favourably on the soundscapes, the feedback does reflect an occasional lack of understanding regarding my methods for reading the pulse and/or composing. When I felt this was due to my own error in presentation (as with ‘Copenhagen 2’), I amended the performance to make the experience more efficient. Yet more practical causes for misunderstanding can also be accounted for by the simple fact that participants’ understanding also depended upon variables such as whether the performance venue was too loud or crowded for me to properly explain my methods within the performance consultation – as did happen on several occasions. Nonetheless, participants responded positively overall to the opportunity to discover and renegotiate new approaches to what a body is and does and what contemporary art, medicine and technology practices are and can do.

Lastly, the most significant result is the fact that five participants have responded to

³⁰⁸ See ‘White Building 3’ in the ‘Participant Feedback Log’ in Appendix VIII, page 281.

³⁰⁹ See ‘Glasgow 7’ in the ‘Participant Feedback Log’ in Appendix VIII, page 287.

³¹⁰ See ‘Copenhagen 1’ in the ‘Participant Feedback Log’ in Appendix VIII, pages 281-283.

their participation in this study by using this project's research as the basis for producing their own creative projects, such as writing critical theory, writing poetry, creating musical compositions, conducting collaborative performances and designing a dance choreography piece.³¹¹ This demonstrates that using practice-based participatory methods – as this project does – affords not only a measurable quantitative result, e.g., positive, negative, did/did not noticed a difference in wellbeing, but it also affords for the creation of new forms of artistic knowledge production that extend beyond the initial reach and impact of this project.

Collaborations

This section explores works that use *Pulse Project's* research as the basis for generating new creative knowledge production that extends beyond the remit of this project. As mentioned in the previous section, several projects have been produced as a result of this research. The most comprehensive collaborations are: *Pulse Project* at 4DSOUND (2015), Budapest, Hungary and *PULSE* (2013) at the University of Huddersfield. However, it is important to point out that other collaborative projects were initiated but never developed past an introductory phase. For example, I was invited to work with the sound artist Iris Garrelfs on an 'acupuncture opera,' but this project didn't develop further due to the difficulty in recording the sounds of the acupuncture session and some ethical considerations about performing an acupuncture treatment as a performance rather than as a therapeutic treatment. Also, as my collaboration with 4DSOUND both significantly extends this project's ability to engage with public audiences and also resulted in this project's inclusion in an international sound art festival (*TodaysArts NL 2015*) alongside peers who are forerunners in the emerging field of biomusic and participatory sound performance, an in-depth discussion of my collaboration with 4DSOUND takes place in Chapter Five³¹² (which explores this project in relation to the work of peers). Therefore the main work discussed in this section is *PULSE* (2013).

PULSE was a collaborative research project and audio-visual performance work by Ryoko Akama, Sumie Kent and myself. The performance formed part of Akama's 'Tones of the Orient' series and was performed at the University of Huddersfield on April 29th, 2013. *PULSE* was initiated and founded on Akama's experience of participating in *Pulse*

³¹¹ Refer to the commentary provided by the participants 'White Building 3,' 'Copenhagen 1,' 'Copenhagen 9,' 'Leeds 5,' and 'Glasgow 7,' in the 'Participant Feedback Log' in Appendix VIII.

³¹² Discussion of *Pulse Project* at 4DSOUND is located in Chapter Five, in the section entitled 'Biomusic, Aural Architecture and *Pulse Project*.'

Project in Leeds in 2012 and consequently *PULSE* adopted the research themes and methodologies of *Pulse Project* as the fundamental basis from which to create a new collaborative project. Research development for *PULSE* was conducted between November 2012 and April 2013 via email correspondence,³¹³ Skype conversation, and monthly meetings. After many presentations of ideas and approaches, we each agreed on a basic outline of the performance, which took place according to the following sequence:

1. I analyse the Koto player's (Kent) pulse and create notations of my impressions. This is conducted as a private consultation.
2. Akama takes my notations and creates an overall score for the performance.
3. Kent and I perform Akama's score³¹⁴ – this was the main event of the public performance (see Figures 25-28).

The performance set-up is outlined as follows (see Figures 26-28):

- Stage left: A music stand holding a metal plate (where I perform the drawing of pulse notations).
- Stage right: The location where the Koto player (Kent) performs.
- Above: A large screen for projecting my notation-drawing performance.

The technical aspects of the piece involved a software program³¹⁵ that interfaced the visual data being sent via the video camera's output (the video camera was attached to my ink brush) with the input of the overhead projector. Thus this interface process allowed the audience to see my notations live on the large screen above (See Figures 25-28). The notations themselves were inscribed on single sheets of paper. The paper rested on a metal plate that was wired for sound so that every pen and brush stroke was amplified into a lush soundscape created by the painting and drawing process.³¹⁶ The sounds of the Koto, the brush sounds and the visuals of the notations were all interspersed with dark silences. This was accomplished by using the sounds from the brush to trigger activation of the video camera via a Max/MSP 'patch.' The visuals of the brushstrokes were then only 'on' during the pulse notation process, otherwise the auditorium was dark during the intervals when there was no notation, i.e., when either the Koto was playing or there were intervals of inaction and silence. This arrangement of silences, sounds and images were outlined in Akama's score.³¹⁷

³¹³ For an edited version of our email correspondences, see Appendix XIII.

³¹⁴ See the Appendix XII for Ryoko Akama's *PULSE* score.

³¹⁵ The software program is MAX/MSP. Please see the Glossary in Appendix I for a definition of this program.

³¹⁶ To listen to a recording of this performance, refer to '*PULSE*' in section III of the enclosed digital audio files and track list at the back of this thesis to listen to a recording of this performance.

³¹⁷ See Appendix XII for Ryoko's score.



Figure 25: *PULSE* (2013) [digital image] © Ryoko Akama, Sumie Kent and Michelle Lewis-King. Photo: Nick Fudge.³¹⁸



Figure 26: *PULSE* (2013) [digital image] © Ryoko Akama, Sumie Kent and Michelle Lewis-King. Photo: Nick Fudge.

³¹⁸ Image details the preparations before the performance, with Akama on the left, Kent on the right and myself behind the music stand. This image makes more explicit the use of Max/MSP as the image shows Akama working out the visuals with the sound inputs and outputs that synchronised the sounds with the images on the screen above.



Figure 27: *PULSE* (2013) [digital image] © Ryoko Akama, Sumie Kent and Michelle Lewis-King. Photo: Nick Fudge.

The logic of the feedback loop was central to the performance of *PULSE*. For example, I first privately recorded Kent's pulse and interpreted this into a notation. Akama then re-interpreted this pulse reading into a score of images, sounds and silences that reflected the processes of my pulse reading and notating Kent's interior vibrational landscape into twelve *jīng-luò* (channels).³¹⁹ Akama's score instrumentalized the notes for the Koto in an open manner that reflected the fact that the Koto player would be consciously performing an interpretation of her 'self' as a set of vibrational tones. So whilst Kent played the tones of her own pulse from the score - at the same time Kent also re-interpreted her own pulse reading while she was playing/performing so as to create a redoubled resonant field that was as much about Kent's meditative intent and self-awareness as it was about reading from Akama's score. Simultaneously, during the performance I also listened to Kent's tones and silent pauses as a 'pulse' in itself, which I then reinterpreted and notated live into a pulse-reading 'response.'

³¹⁹ It is relevant to point out that each of the twelve channels drawn in my notations are represented and 'played' by the twelve strings of the Koto.



Figure 28: *PULSE* (2013) [digital image] © Ryoko Akama, Sumie Kent and Michelle Lewis-King. Photo: Nick Fudge.³²⁰

In this way, *PULSE* combined digital technology and inter-personal consciousness with traditional instrumentation to explore both interior and exterior forms of pulsation as a relational cosmology of sounds, thoughts, gestures and images. These cosmological loops of listening, interpreting, articulating sounds and drawings that were generated during the performance of *PULSE* were originally informed by my notating and organising the pulse into twelve ‘channels’ of sound in *Pulse Project*. Yet, what sets *PULSE* apart from this project is the way Akama reinterpreted my adaptation of CM pulse-analysis into the creation of a duet performance between the Koto player and myself – a *double* pulse analysis that travelled both sonically and psychically between the Koto player, myself and the audience. In this way, *PULSE* significantly widened the theme of interpersonal communication initiated by this project and thus demonstrates how initial research participation in *Pulse Project* was significantly extended into unknown directions that generated new research and a larger body of creative production.

Lastly, Kent and I continue to collaborate using *Pulse Project* as the basis for creating new audio-visual performances. The images below demonstrate one such performance at

³²⁰ This image shows the metal plate on the music podium, the ink brush (held in my hand) with a mini video camera attached that is connected to the Max/MSP patch via the computer – which created the visual display. This image also demonstrates both Kent and I playing Akama’s score (which is on the table and also on the stand in front of the Koto in this image).

Rock House Art School, Hastings (UK) on April 10th, 2015. In this performance, I simply used an overhead projector to script my pulse readings and Kent interpreted each reading into individualised Koto performances.



Figure 29: *Pulse Readings: Rock House* (2015) [performance view] © Michelle Lewis-King and Sumie Kent. Photo: Léna Lewis-King.³²¹

³²¹ This image demonstrates some solutions to the hidden aspects of pulse reading and translating the inscriptions into sounds and music. In this performance, I produced live drawn notations of each of the *zàng-fǔ jīng-luò* felt during each participant's pulse readings using transparencies, coloured ink, pens and an overhead projector. As Kent and I spent much time talking about the pitch of each coloured line and what element they represent (and the sonic nature of the elements), Kent interpreted and improvised the live drawings into Koto music for each participant.



Figure 30: *Pulse Readings: Rock House* (2015) [performance view] © Michelle Lewis-King and Sumie Kent. Photo: Léna Lewis-King.

5. Art, Medicine, Society, Sound

Preface

This chapter positions *Pulse Project* both in relation to key contemporary artistic practice discourses and also in relation to a selection of works by peers that investigate similar areas of concern to those explored by this project. Accordingly, this chapter is divided into two main discussions. Part One develops a theory-based discussion that contextualises *Pulse Project's* public performances within relational aesthetics, ethico-aesthetics and sound studies discourses. Part Two provides a practice-based analysis of *Pulse Project* in relation to three approaches to practice-based social art production: artists working with biomusic and aural architecture, artists developing transdisciplinary projects that examine the relationships between art, medicine and society and also artists who work with Chinese medicine as an artistic medium.

Part One

Relational, Transversal and Ethical Aesthetics

Relational Aesthetics

This project investigates the socio-cultural relationships between art, science and technology – and also the relationships between the production and reception of artworks within social contexts. Consequently, I open this section by first situating *Pulse Project* in relation to relational aesthetics discourse. Controversial art theorist and curator Nicolas Bourriaud, who coined the term ‘relational aesthetics’ defines it as a type of institutional practice that ‘tak[es] as its theoretical horizon the realm of human interactions and its social context’ (Bourriaud, 1998, p.14). Bourriaud’s main postulations are that relational art articulates a meta-space for exchange between institutions and the public commons, and that encountering this form of art shapes and enables new ‘models of sociability’ (Bourriaud, 1998, pp.17, 28) because these new models for social exchange exert an autonomy from the dominant institutional body politic of capitalism. Bourriaud also differentiates ‘relational art’ from ‘participatory art’ by stating that the later ‘oversimplifies’ the complex dynamics of relational aesthetics (see Schlatter, 2010, n.p.) – that ‘each particular artwork is a proposal to live in a shared world, and the work of every artist is a bundle of relations with the world, giving rise to other relations, and so on and so forth, ad infinitum’ (Bourriaud, 1998, p.22).

However, as (Bourriaud’s) relational aesthetics was increasingly expressed through institutions such museums and galleries, voices of criticism surfaced – most notably from art historian Claire Bishop, artist Andrea Fraser and art theorist Hal Foster. In *Antagonism and Relational Aesthetics* (Bishop, 2004), Bishop draws attention to the superficiality of Bourriaud’s approach by writing, ‘if relational art produces human relations, then the next logical question to ask is what *types* of relations are being produced, for whom, and why’ (Bishop, 2004, p.65). Here Bishop calls attention to the more quotidian aspects of relationality that go beyond the display of social transformation by inquiring into the practical potential for relational aesthetics to effect change within a community, as Bishop makes clear with this statement: ‘the relations set up by relational aesthetics are not intrinsically democratic, as Bourriaud suggests, since they rest too comfortably within an ideal of subjectivity as whole and of community as immanent togetherness’ (Bishop, 2004, p.67).

Furthermore, Bishop calls for (Bourriaud’s) relational aesthetics projects to consider more deeply the political agendas of the institutions that host them as well as the actualities of the given communities that relational aesthetics projects attempt to transform. Additionally, both Foster and Fraser critique Bourriaud’s relational aesthetics as confusing conviviality with democracy. In conceiving of relational art as the development

of autonomous spaces providing the public with social experiences instead of understanding that relational art already 'embod[ies] the art institution' (Fraser, 2005, p.282), Bourriaud fails to acknowledge that relational aesthetics simply repeats the production of institutional power through amusement.³²² Bishop's critique reiterates what Foster suggests, which is that relational aesthetics merely aestheticizes the conviviality of the 'procedures of the service economy - such as invitations, meetings and appointments,' (Foster, 2006, p.195) rather than critique the reproduction of institutional power (see Malone, 2007. p.22).

Along similar lines to relational aesthetics practice, 'cross medium social art,' 'collaborative art,' 'socially engaged art' and 'participatory art' are all terms that describe similar but slightly variegated practices. Jackson contrasts cross-medium social art and socially engaged art by stating that cross-medium art:³²³

'challenges the inherited parameters for defining the within and without of art... [and as such] responds to a long-standing debate in twentieth and twenty-first century on autonomy and heteronomy - art's proper inside and external outside... [Therefore] the problem with socially engaged art would seem... that it is beholden to the "external rules" of the social.' (Jackson, 2011, pp.28-29)

I would identify my project within this definition of cross-medium social art were it not for the fact that Jackson states that socially engaged art is not aesthetic because it cannot separate itself from the social 'long enough to take a properly critical or interrogative stance' (Jackson, 2011, p.29). Overall, I find Jackson's distinctions between socially engaged art and cross-medium social art somewhat superficial, as I argue that if a socially engaged art project is conducted as a research project (which many of them are), then Jackson's statement about socially engaged art lacking an aesthetic (critical) dimension no longer holds true.³²⁴ Bishop however addresses the ambiguousness between the different terms currently defining social art practices by writing:

'This expanded field of post-studio practices currently goes under a variety of names: socially engaged art, community based art, experimental communities... participatory art, collaborative art... I will be referring to this tendency as "participatory art" as this connotes the involvement of many people... as a politicized working process.' (Bishop, 2012, pp.1-2)

³²² See Fraser, 2005, p.282 and Malone, 2007, p.22.

³²³ The Tate defines socially engaged art as: 'any artform which involves people and communities in debate, collaboration or social interaction' (Tate, 2016, n.p.). Having searched Anglia Ruskin University Library databases, Google Books, Google Scholar and Google Search, my search results reveal that Jackson is the only author visible (according to the limitations of such searches - as a conversation that is tagged, online and in English) discussing 'cross-medium art' as a separate category from the term 'socially engaged art,' which is more widely used within contemporary art discourse.

³²⁴ In fact, if you add a research element to socially engaged art practice, it might not be able to be differentiated from what Jackson defines as cross-medium art. This further demonstrates my point on the weakness of Jackson's differentiations.

According to Jackson's and Bishop's definitions, this project then works both within and outside the institution of socially engaged art by initiating ethical and interactive communication between personal, social and institutional domains. Yet, my work also involves a one-to-one relationality that is analyzed via participatory research,³²⁵ and consequently, it is both interactive and reflexively critical. This is somewhat different from the aim of socially engaged art that places its emphasis on using art to create new social communities (see Bishop, 2012, pp.1-3). Since relationality and the building of unique relationships between people, disciplines and cultural practices is a central theme running throughout this project, this project aligns more with – and adapts for its own use – the concept of relational aesthetics. Moreover, *Pulse Project* contributes to relational aesthetics discourse by widening its focus beyond an Euro-American centred discussion on the role art institutions play within society towards a discussion on the body-politic of intercultural and transdisciplinary relations between Chinese and Euro-American institutions of art, technology and life sciences.

Transversal Relations and Ethico-Aesthetics

In the wake of enduring neoliberal appropriation of the social sphere by private industrial interest³²⁶ and the current civic unrest and call to redefine the role of citizenry,³²⁷ the focus on subjective and ethical social relationality within my work is allied with the rising trend within global societies to redefine the body politic of institutions and communities – to rethink what a 'body-politic can do.' I bring Deleuze and Guattari's (1987, p.257) statement of 'what a body can do' into this section to extend their ethical exploration of the subjectivity of the body towards investigating the subjectivity of the body within social contexts – as this project investigates the body on three levels: the question of the body itself, the question of the affective body³²⁸ created from interpersonal relationships and the question of the body-politic as a process-oriented (alchemical) development that is created by emergent relationships between oneself, society, technology and the environment.

³²⁵ As discussed in the section 'Participant Engagement and Feedback' in Chapter Four.

³²⁶ For discussion on the history and political dynamics of neoliberal domination of the social commons see Vinod and Deshpande, 2013, p.316; Hardt and Negri, 2008, p.22 and Federici, 2011, n.p.

³²⁷ For example, the recent (April 2016) French demonstrations *Nuit Debout* offer a new form of social practice that has brought people together into the public sphere as a means for resisting 'top down' governance whilst at the same time actively creating new citizen practices, which correspond to Guattari's ethico-aesthetics paradigm (this is discussed on the next page) by including the practice of poetry alongside the development of new forms of ecological and socio-political activism. See Chrisafis, 2016, n.p.

³²⁸ This notion of the affective body is further elaborated on in the next section: 'Pulse Project in Relation to Sound Studies.'

As part of the process of its creative analysis, *Pulse Project* develops new bodies of sonic-experience-as-knowledge that aim to benefit the wellbeing of both singular and collective listeners by creating unique inter-relational resonances between personal, social, cultural and spatial domains. This approach is relational, ethical and aesthetic in nature, which can be aligned with Guattari's concept of the 'transversal' developed as an integral part of his ecosophy.³²⁹ The transversal is a processual approach to 'remaking social practices' so as to produce a more 'precious [form of] capital' (see Guattari, 1996c, p.272). Guattari uses the transversal to create new social practices that engender an 'authentic hearing of the other ... a hearing [that] could overturn or restore [the dominant] direction to [institutional] structures, by recharging them with potentiality, by deploying, through them, new lines of creative flow' (1996c, p.271). The lines of creative flow Guattari writes about here enact his notion of transversal process – a process that works as an agent of institutional critique and reconfiguration. Guattari's transversal intensities or 'lines of creative flow' can be thought of as agential flows (processes) that both 'deterritorialise'³³⁰ the dominant structures of an institution and simultaneously create new interconnected practices that transform social experience in space-time.

Guattari's intent in calling for a new 'ontological pluralism' (Guattari, 1996b, p.216) that interconnects human subjects with social discourses and the global environment was to develop a knowledge-technology capable of delivering a more equitable (less anthropocentric) relationality to the nexus of humans, praxis and nature.³³¹ Guattari's advancement of the transversal (as a knowledge-technology) is in answer to the technical mode of control that valorises hegemony via the development of rigid 'vertical' and binary structures that assemble into power-centred architectures (see Guattari, 1984, p.239). Conversely, developing transversal connections work toward a socio-ethical construction of a living and vitally creative 'eco-humanity' (see Guattari, 2000, p.51).³³²

Guattari's transversal approach and it's potential to create new 'ethico-aesthetic paradigms' (Guattari, 1995) is particularly relevant to this project as transversal processes

³²⁹ This is Guattari's convergence of the terms ecological philosophy, see Guattari, 1996c, p.264.

³³⁰ See Deleuze and Guattari, 1987, pp. 9-11 for discussion of the processes of deterritorialisation (deconstruction) and reterritorialisation (reconstruction) in the transformation of social practices.

³³¹ Guattari emphatically states he does not propose a 'falling back into ... authoritarian vision of history ... which in the name of "paradise" and ecological equilibrium, would claim to rule over the life of each and everyone' (1996c, p.271), making it clear he prefers to develop individualistic 'cartographies' that add to the ethical becomings of the world (p.271).

³³² This discussion recalls the discussion on Heidegger's *Gestell* in Chapter Two, as Guattari similarly calls for a reworking of the human-technology-nature nexus. However, as Salter (2010) points out, Guattari calls for a stewardship of the human/nonhuman relationship from a place of parity – where humans, socio-political systems, technologies and the environments they engage with all collectively co-create entangled realities that have positive potential to transform the world. Whereas Heidegger's elaboration on technology (via *Gestell*) places the human in charge of nature, thereby setting up an anthropocentric episteme (see Salter, 2010, p.xxxv).

enable the creation of a novel encounters that destabilise the established rule of law and weave together different subjective realities into unique socio-environmental configurations. Guattari describes the transversal ethico-aesthetic process as:

'The incessant clash of the movement of art against established boundaries... its propensity to renew its materials of expression and the ontological texture of the percepts and affects it promotes and brings about ... [its] highlighting and a re-evaluation of the creative dimensions that traverse all of them. Patently, art does not have a monopoly on creation, but it takes its capacity to invent mutant coordinates to extremes: it engenders unprecedented, unforeseen and unthinkable qualities of being.' (Guattari, 1995, p.106)

Thus the theories and artworks discussed in this chapter create unique ethico-aesthetic cartographies in just the manner Guattari describes above by theoretically contextualising or directly utilising artistic practice to create experiences that ethically reformulate socio-environmental relationships. This approach represents an important 'balancing' strategy to capital development. Developing projects that create complex transversal relationships between personal, disciplinary, institutional and environmental terrains becomes increasingly advisable as we enter an advanced stage of capitalism where emphasis is placed on amassing 'cultural capital'³³³ (an approach that creates blockages for the free flow of creativity by promoting projects that are tethered to commercial or power-building interests) over creative grassroots initiatives that enable new and unexpected forms of temporal being-togetherness (processual eco-ontologies) between humans, cultural discourses and the environment.

Pulse Project and Sound Studies³³⁴

This section discusses *Pulse Project* in relation to a selection of sound artists and theorists to articulate the correspondences and divergences between this project and the work of relevant peers within the context of contemporary sound studies discourse.

One of *Pulse Project's* main innovations to sound studies is that it introduces a unique method for transposing infrasound into sound through adapting a premodern technology (CM diagnostic palpation) into a tool that provides a 'new' way of reading the infrasonic body – which is then communicated through sound. What makes this study different from

³³³ Bourdieu and Passeron (1977) first coined the phrase 'cultural capital' in *Reproduction in Education, Society and Culture* where they define it as the development of attributes that strengthen the aims of social status, i.e., attributes such as education, professional networks and particular knowledge and/or skills which confer social advantage on particular individuals or groups. See Bourdieu and Passeron, 1977, pp,10-11, 72.

³³⁴ As this is a transdisciplinary practice-based project that creates complex inter-relationships between disciplines, the development of a comprehensive theoretical position on sound in itself is beyond the scope of this thesis.

other sound studies is its exploration of the sonic terrain of the interior body from an alternate perspective to (Western) conventional medicine and technology. This study thus provides an original means for producing and understanding sound relative to inter-relational embodied emergence and demonstrates the unique ways in which sonic research can perform a translation and synthesis of different practices, e.g., art and medicine, Chinese and Euro-American approaches to science and technology, embodied knowledge practices and so on.

Pulse Project uses touch in the following ways:

- As a relational tool to interconnect oneself with others.
- As a method for listening to non-cochlear sound.
- As a method for creating sonic portrait-bodies (sonic bodies that resonate a concrete knowledge of the body).

Through using touch to create a body of sonic portraits, this method enables me to investigate and convey my research findings on the body as a living organism that is not cut off from others or the environment, but is affectively and physiologically interwoven within the fabric of space-time unfoldings.³³⁵

This project investigates the use of intimate touch as a means for connecting with others and for producing sounds that explore the embodied and inter-subjective space-time between self and other. It is important to firstly acknowledge that research participants play a vital role in the production of this research, as their participation co-produces strands of research that are incorporated into this project. Moreover, it is important to acknowledge the role participants and audiences play in their listening to and being affected by each soundscape as ‘completing’ the work. The social experience of listeners creates a ‘share’ (see Gombrich, 1960)³³⁶ in the work, i.e., the meaning of the work is created through interaction and/or physical experience of listening to the resonant forms of meaning embodied within each soundscape.

The audience’s interaction with resonance-as-meaning is mentioned here in reference to Nancy’s (2007) discussion on meaning-as-listening... that to ‘listen is an attempt to

³³⁵ This concept of space-time unfoldings relates to Barad’s concepts of ‘agential realism’ (2007, p.33) and ‘spacetime-mattering’ (see Kleinmann, 2012, pp.80-81 for his discussion with Barad on this concept) as discussed in the section titled: ‘Practice, Performance and the Clinic’ in Chapter Two.

³³⁶ Here I refer to Gombrich’s (1960) concept of ‘the beholders share’ that acknowledged the role audiences as beholders play in contributing to artworks. Gombrich’s theory is an advancement of Riegl’s (1902) concept of ‘attentiveness’ whereby Riegl asserts that the role of the appreciator of artworks has not been properly accounted for within art history and aesthetics (for discussion on Riegl’s concept, see Olin, 1989, pp.285-299). Gombrich develops Riegl’s concept into a theory that investigates through case-studies how beholders of artworks contribute towards the production of aesthetic meaning through affective engagement with hidden forms of meaning within artworks, on both conscious and unconscious levels of thought. See: Gombrich, 1960, pp.181-242.

understand – to be on the “edge of meaning,” “meaning whose *sense* is supposed to be found in resonance, and only in resonance” (Nancy, 2007, p.7). Nancy’s meaning-as-listening corresponds to *Pulse Project*’s sonic works and performances in that each individual’s *infrasonic* being-as-rhythmicity is interpreted and performed or played-back as unique and spatially dynamic *sonic* bodies. This produces a sensorial, affective and reflective interactivity between the infrasonic inside of the body and sonic architectures existing outside of the body. There is also interactivity between the audiences’ bodies-in-being and digital assemblages of rhythmic embodied sound. These body-sound interactions concretise Nancy’s proposition that sense plays a vital role in the interpretation of resonant meaning – as significant understandings that can only be realised via the body’s sensible interaction within sonic fields.

Sound and the Affective Social Economy

To demonstrate how this work creates a new approach to sound studies and also produces new resonant meaning, I first contextualise the production and playback of my sound works within the production of an ‘affective’³³⁷ social economy.

In a return to Guattari’s concept of the transversal mentioned earlier, Bertelsen and Murphie (2010) discuss Guattari’s transversal/ethico-aesthetic paradigm as the development of ‘affective intensity.’ They argue that for Guattari, to decide to practice either scientific objectification (of the lifeworld) or processual creativity (co-production within the lifeworld) was a question of ethics and that developing transversal connections must allow for an acknowledgement of (or listening to) others, of plurality (see Bertelsen and Murphie, 2010, pp.151-152). ‘Affective intensity is literally the life of territorial processes. A territory is its differential intensities... [that] cannot be reduced’ (p.152).³³⁸ By this Bertelsen and Murphie refer to the multiplicity of intensities that exist between real

³³⁷ I define affect in the context of this project as the production of phenomena that adds sensible dimensionalities to the body-lifeworld relationship. In terms of sound, sound-affect can be described as a medium that enables a sensible awareness of and interaction with complex layers of lifeworld emergences (whether personal, technological or natural). Affect can be described as a medium of sensory relations that are active within the in-between and interior-exterior zones of the body-lifeworld axis. Sonic affect is used in this project to interconnect the entirety of the body-network with the ‘ontological pluralism’ (Guattari, 1996b, p.216) of temporal socio-cultural environments. Sonic affect materialises relational processes that also possess dynamic momentum. Sound forms, travels and dissipates and is not an *objet fixe*. It *moves*. It is quantum in its multidimensional inter-relationality, i.e., in the way it moves (resonates) within and through the body (via entanglement with matter and time-space) and throughout the fabric of the unfolding lifeworld. Therefore, sonic ‘affect’ in the context of this study is specific to producing sound as a medium that creates new sensorial, relational and temporal architectures between and within participants, audiences, and myself.

³³⁸ Here Bertelsen and Murphie (2010) refer to Guattari’s use of the concept of the transversal to resist the reductive and power-centred focuses of the modern science paradigm with an ethical aesthetic paradigm that creates plurality, relational and affective ‘intensities’ between human and nonhuman agents. To refer to Guattari’s original writings on this theme see Guattari, 1996a, p.159.

bodies within a community (see 2010, p.152) and argue that it is the affective dimension ('intensity') between self, others and situations which ultimately has the 'potential' to positively transform real-life situations (see 2010, pp.153-156).

Developing upon Bertelsen's and Murphie's (2010) theme of transversal connectivity as affective intensity between agents and environments in the lifeworld, Schrimshaw (2013) takes this notion of affective intensity and applies it to sound – specifically to 'non-cochlear' sound (see Kim-Cohen, 2009). This tying together of affective intensity and non-cochlear sound is directly relevant to this project in its investigation of non-cochlear sound as the basis for composing soundscapes that produce new transversal connections (via affect) between people, phenomena, technology and environments. Schrimshaw takes Sterne's (2003) 'audio-visual litany' as his theoretical point of departure, which Schrimshaw describes as 'the staging of a binaristic relation between the intimate interiority of hearing and the objective, exteriority of vision' (Schrimshaw, 2013, p.19), and is – along with Sterne (2003) – particularly critical of the significant number of sound theorists who associate sound with interiority (2013, p.42). Schrimshaw subsequently defines sound as an affective 'extrasomatic' (2013, p.43) entity that exists beyond hearing with the ear, and also beyond anthropic embodied 'individualism.' Schrimshaw argues for sound to be thought of as zones of affective intensities that exist as *extra* to humanity. In alignment with Deleuzean philosopher Brian Massumi (1995), Schrimshaw cleaves affect from affection, setting it apart from emotion and sensation.

Critical of Kim-Cohen's (2009) postulation of non-cochlear sound³³⁹ as falling into the mire of 'anthropic terms of linguistic and conceptual correlationalism' (Schrimshaw, 2013, p.42), in Schrimshaw's adaptation of non-cochlear sound, he defines it as an affective object that emerges from the 'continuum between thought and nature' (p.42) – or as objectual zones of nonhuman intensities (noise) produced from a 'scientistic art of signals' (p.42). My own position on non-cochlear sound rests somewhere in between Schrimshaw's call to materialise sonic affect as signals that travel beyond the ear (2013, p.42) and Kim-Cohen's socially constructed and conceptually generated notion of non-cochlear sound.

However, I argue that Schrimshaw's understanding of the scientistic echoes the modernist approach (what Guattari refers to as 'scientism')³⁴⁰ as a practice that attempts to separate subjects (including humans) from their complex practical realities. Moreover, Schrimshaw's arguments for a sonic 'transcendental materialism' (Schrimshaw, 2013,

³³⁹ Kim-Cohen's (2009) non-cochlear sound takes Duchamp's non-retinal painting as the point of departure for theorizing a position on sound that is non-aural, conceptually-oriented and produced through socio-technical encounters.

³⁴⁰ See Guattari, 1995, p.26.

p.41), his thinking of the body as a closed system (as separate from the nonhuman), the distinctions (cuts) he makes between affect and emotion – and particularly his ascribing a superiority to ‘affect’ as potential and ‘affection’ as simply anthropic... from my point of view, these are all problematic stances. Some questions that trouble Schrimshaw’s separation of affect from affection and his definition of affection (emotion) as anthropic would be: ‘Do animals, insects and plants feel? In what ways do they feel (and how might we ethically interpret these feelings)?’ These questions reveal the absurdity of separating humans from nonhumans and also reveal the human need for detachment³⁴¹ by positioning transcendent thinking as superior to embodied feeling. Additionally, Schrimshaw’s statement that ‘sound must be heard to be defined as such’ (Schrimshaw, 2013, p.44) seems to ignore the entire notion or definition of infrasound as an integral aspect of sound phenomena. Infrasound is certainly non-cochlear and can be seen and felt (via vibration) even if it cannot be heard.

Consequently I suggest that Schrimshaw’s elaborations on transcendental nonhuman sound-affect develops a ‘listening from nowhere’³⁴² that reinstates the tired divisions between human and nonhuman existence, a position that ignores the last fifty years of feminist critique of object-oriented anti-anthropocentric ‘objectivity’ (as already discussed in Chapter Two).

To return once more to Guattari’s transversal, in this section I discuss Thompson’s and Biddle’s (2013) advancement of Guattari’s notion of transversal connectivity (affective connectivity) in relation *Pulse Projects*’ approach to sound theory. Thompson and Biddle ask a similar question to Deleuze’s (1992) ‘what can the body do?’³⁴³ in order to activate a theoretical shift from thinking to feeling (from epistemology to ontology) by stating that:

‘with affect... the question shifts from “what does music mean?” to “what does music do?”... What is required is consideration of sonic cultures more broadly; questions regarding the circulation, modulation and perception of sound as an affective vibrational force.’ (Thompson and Biddle, 2013, p.19)

This shift from thinking about sound (what is it?) towards creating knowledge about sonic processes and/or the perception of sound (how does it work? how does it feel?) within sound theory discourse has a central significance for this project. This is because *Pulse Project* uses sound to materialise perceptive and processual knowledge of the relational body by shifting focus from sound object studies – the study of a thing-in-itself (object

³⁴¹ The emotional need for detachment within modern science was discussed previously on pages 93-94.

³⁴² This is the sonic equivalent of the ‘View from Nowhere’ (Nagel’s [1986] and Haraway’s [1988] critique of objectivity) mentioned in Chapter Two, pages 35-37.

³⁴³ I use this question in a similar way to Thompson and Biddle in the Introduction to this thesis – see page 6.

ontology) – towards creating understanding of plural ontological sonic relations, within, between and around living beings... knowledge as a form of rhythmic *music*.³⁴⁴

In analyzing human pulses as the source for creating electronic musical soundscapes-as-knowledge, infrasound, sound and music are not treated as separate phenomena in this project, but as phenomena on a continuum – as different expressions of ‘rhythmicity.’ Incorporating Bachelard’s (1950) and Lefebvre’s (2004) writings on rhythmanalysis, Goodman (2010) discusses rhythmicity as an:

‘ecology of speeds [that] implies that bodies, including collective bodies, are defined not as closed, determinate systems, formed, or identifiable merely by their constituent parts or organs and tending toward rhythmic equilibrium or harmony, but rather by their rhythmic consistency and affective potential.’ (Goodman, 2010, p.102)³⁴⁵

Goodman further articulates rhythmicity as:

‘a vibratory nexus [that] falls under two distinct aspects: its composition (rhythmic consistency) and its capacity to affect and be affected by other entities. These conceptual components can be deployed to map the affective mobilization of a population immanent to a rhythmic anarchitecture.’³⁴⁶ (Goodman, 2010, p.103)

What is significant to this project is that Goodman’s (2010) definition of rhythmicity best describes the inter-relational affective complexity of embodied sounds between people, environments and matter as not simply music or sound but as the ‘vibrational ontology’ of the lifeworld itself. In this way, Goodman’s interpretation of spatio-temporal rhythmicity comes closest to this project’s analysis of sound as vibrational rhythm... as immersive anarchitectural matrices comprising a variety of waveforms, timbres, frequencies and tempos that resound within the plural unfolding of the lifeworld.

Pulse Project produces a cartography of rhythmicities as lifeworld events – rather than produce a study about (cochlear) sound-in-itself. The cartographies, expressed in the form of notations and compositions, map each pulse reading as rhythmanalysis event.³⁴⁷ *Pulse Project* cartographies are both auditory and visual as well as infrasonic and spatio-temporal. The spatio-temporal layers of each pulse soundscape are mapped visually into

³⁴⁴ Similar to musicologist Brian Kane’s (2013) critique of the artificial but pervasive distinction between sound and music that extends across contemporary sound theory discourse, I also make no significant differentiation between sound and music as I see this endeavor as creating a false dichotomy between what is essentially the *organization* of sounds (via natural, technical, anthropocentric and other methods) and the *listening* to organized and non-organized sounds.

³⁴⁵ This section demonstrates rhythmicity theory’s tendency toward process-oriented rather than object-oriented ontology.

³⁴⁶ Anarchitecture is a form of institutional critique developed by Gordon Matta-Clarke and other artists in 1974. The main aim was to create an architecture of destabilisation to counter-act modernist architecture’s complicity in the creation of capitalist institutions, e.g., as hegemonic power-building structures. See Spatial Agency, n.d.

³⁴⁷ As discussed in the section entitled: ‘*Pulse Project* as Rhythmanalysis’ in Chapter Four.

notations, visual animations³⁴⁸ and audio compositions/designs that are then translated and amplified via computational processes into multichannel installations³⁴⁹ and live sonic performances.³⁵⁰ Moreover, *Pulse Project's* live performances translate and redesign the rhythmic time-space of each participant's infrasonic body into rhythmic sonic body-events (architectures) that dynamically intertwine and shift through architectural time-space. Each sonic body-event³⁵¹ also creates an internal-external sympathetic resonance – as the frequency of each organ resonates both outside the body within a given environment (as a digital *zàng-fǔ* organ) and inside the body of the audience, i.e., in resonance with the rhythmicity of audience participants' organic *zàng-fǔ* systems.³⁵²

Lastly, building upon the approach of creating new resonant inter-relationships between the body of audiences, techno-rhythmic bodies of digital sound and spatial environments as described above, Ouzounian's 'Embodied Sound: Aural Architecture and the Body' (2006) addresses the emergence of a new paradigm in sound where artists '[design] sound works that are not only heard by the ears, but produced at a particular intersection of bodies, sounds and technologies' (Ouzounian, 2006, p.69).³⁵³ In the following passage, along similar lines to Goodman's (2010) discussion on sound-affect as rhythmic anarchitectures, Ouzounian (2006) discusses the specific ways in which embodied sound-affect creates real and imagined architectures that spatially reconfigure the social

³⁴⁸ This is achieved using 4DSOUND's '4D Animator,' which is discussed in more detail in Footnote 378. See also 4DSOUND, n.d(a).

³⁴⁹ Here I refer to the designing of SC compositions and the communication between the SC program and the SC server (which relays the code to a database and transforms the commands into sound) and a system of mixers and speakers. It is important to point out that some SC compositions were composed in stereo as headphone pieces and others were composed as multichannel installations. In this way, my SC works create different sonic architectures. The headphones compositions create a self-reflective space of listening, whilst the multichannel compositions create a space for engaging with embodied soundscapes with one's entire body. Moreover, the audio designs created at 4DSOUND (this is discussed in more detail later on in this chapter) demonstrate how the sounds translated from each pulse reading are mapped across 4D's sixty-two-speaker system in order to create bespoke and spatially dynamic soundscapes. See Figure 31.

³⁵⁰ The performances I refer to here are the soundscapes created in collaboration with 4DSOUND, which enabled me to use a touchscreen interface and 4D's unique software to create one-off live performances – similar to the way a DJ works with sound (by manipulating sounds in space live via touching/moving controls on a digital interface). See 4DSOUND, n.d (a). for a more in-depth description of this process.

³⁵¹ Here I refer to both the multichannel playback of SC compositions and also the live sonic performances at 4DSOUND.

³⁵² This was tested out at *Circadian: 4DSOUND at TodaysArt NL 2015* where, to give one example, two participants told me they could feel their bladders vibrating during a 'Water' pitch composition (at 440Hz – which corresponds to the Urinary Bladder and Kidney according to theories already discussed in pages 101-102). The audio interface was also designed to move specific frequencies to specific locations within architectural space. Further discussion about this interface – made uniquely for *Pulse Project* – can be found in next the section: 'Biomusic, Aural Architectures and *Pulse Project*.'

³⁵³ This sonic investigation of intersectionality described in this passage by Ouzounian (2006) bears direct relation to the title of this thesis.

relationships between bodies of sound and the listener and also give added significance to personal spaces:

‘Sound works designed for the body tend to bear a strong sense of ritual, conjoining physical spaces with their metaphysical complements. An encounter of real and imagined spaces, wrought in the body, produces alternating fields of vibration — at times beating positively to create an augmented awareness of self, spirit and surrounding; at other times clashing to reveal the limits of the body: that it is socially determined and determining... In reviving the corporeal with respect to sonic experience, we cross the boundary from the impartial to the very personal, reclaiming that marginalized space as a space of significance.’ (Ouzounian, 2006, pp.70-71)

Ouzounian makes the case for the particular ways in which embodied soundscapes enable a critique of modernist tropes:

‘Feminist and transcolonial critique has challenged such conceptual dichotomies as the spirit/body and mind/body binaries, historically used to imagine the body of the Other (with respect to Western man)... Along the way it has re-positioned the body as a site of knowledge and even of historical action... By including the body in the reception and analysis of a work, authors (including myself) cannot avoid or avert self-representation. An embodied reception reveals the body’s biases, tendencies and aims—in other words, its history.’ (Ouzounian, 2006, pp.70-71)

Rather than using sound and infrasound to theoretically demonstrate an autonomous position – such as Schrimshaw’s (2013) development of sound-affect as a ‘listening from nowhere,’ I use Ouzounian’s arguments in relation to my project to articulate the ways in which earlier discussion of Haraway’s *Situated Knowledges* (1988) in Chapter Two³⁵⁴ can now be adopted to argue a particular position on sonic ‘objectivity.’ *Pulse Project* soundscapes produce rhythmic architectures that are both relational and objective. Each soundscape balances human with nonhuman being³⁵⁵ and at the same time demonstrates how the translation of embodied non-cochlear sound into affective sonic architectures is able to interconnect the personal, hidden and inaudible with the social, sensible and aural. Ouzounian makes the case for the designing of embodied aural architectures as an objective practice by bringing Haraway’s ‘*Situated Knowledges*’ critiques into (male-dominated)³⁵⁶ sonic discourse: ‘Haraway’s vision of an embodied objectivity... aimed at dislodging the tropes of scientism... does [so] by challenging the (normalized) neutral, disembodied and implicitly objective stance traditionally taken by historians and critics towards their subjects’ (Ouzounian, 2006, p.70).

Consequently, *Pulse Project* produces a new body of sound-affect that bridges the gap

³⁵⁴ See pages 36-38.

³⁵⁵ Nonhuman in this context can signify both the Chinese nonhuman (the alchemical processing of the world through *wǔxíng*, *yīnyáng* and *qì*) and Western nonhuman (soundwaves, electromagnetic waves, technological equipment and architecture).

³⁵⁶ See Rodgers, 2010, pp.15-19 for discussion on the male-dominance of sonic arts and electronic music fields and traditions.

between Schrimshaw's (2013) thesis that argues for an autonomous 'scientific' non-cochlear sound and Ouzounian's development of sound as unique, situated, embodied and inter-relational aural architectures – as my pulse diagnosis investigations advance a scientific yet situated and relational study of non-cochlear sound. Through producing sound-affect as transversal sonic events that are at once ethical, artistic, scientific, sonic and infrasonic, *Pulse Project* creates a unique approach to relational aesthetics through sound. Each pulse composition and soundscape creates rhythmic inter-resonances that traverse between real and imagined worlds, between the interior of spaces of the body and exterior spaces, between oneself and others, between cultures and between human and nonhuman 'timespacematterings'.³⁵⁷

³⁵⁷ See Klienmann, 2012, pp.80-81 for discussion of Barad's term 'timespacemattering.'

Part Two

Biomusic, Aural Architecture and *Pulse Project*



Figure 31: *Nue* at *Circadian: TodaysArt NL2015* (2015) [installation view] 4DSOUND at Electriciteitsfabriek, Den Haag. © 4DSOUND. Photo: Georg Schroll.³⁵⁸

Listening to the Body: Biomusic

Due to the ever-emerging plurality of sound art practice, discussion in this section focuses on select artists working with sound as auscultation processes (listening to the body) and spatial sound (the sonic environment as a 'body'). The artists' works discussed in this section bear a direct peer relationship with *Pulse Project's* performances and soundscapes.

As part of 4DSOUND³⁵⁹ at *TodaysArt NL 2015: Circadian*,³⁶⁰ *Pulse Project* performances were featured alongside interactive sound performances by artists Lisa Park and Marco Donnarumma whose works also include the auscultation of (human)

³⁵⁸ In this image, Lisa Park's dress for *Nue* outlines the parameters of 4D system as it is installed within the architecture of the Electriciteitsfabriek building in Den Haag. This image appears courtesy of Lisa Park and 4DSOUND.

³⁵⁹ 4DSOUND is defined as: 'a laboratory and cultural collective exploring Spatial Sound as a medium. Since 2008, it has developed an innovative Spatial Sound technology that has significantly improved and expanded the possibilities to create, perform and experience sound spatially. 4DSOUND is a fully omnidirectional sound environment, where the listener can appreciate Spatial Sound images in a virtually unlimited spatial continuum. Sound can move infinitely distant or intimately close to the listener: it moves around, as well as above, beneath, in between or right through them.' (Todays Art, 2015, n.p.)

³⁶⁰ See 4DSOUND, 2015b for the full program of *Circadian at TodaysArt*.

bodily process in addition to the sculpting of embodied sounds into (live) spatially dynamic and socially interactive soundscapes. Park, Donnarumma, and I were commissioned by 4DSOUND to make new works that would respond to *Circadian*'s theme, which 4DSOUND describes as:

'investigating how spatial listening influences conscious states throughout the day and night. Together with a range of collaborators from the field of arts, technology and science, we investigate... how understanding these states can lead to new interactive forms of art. We explore new ways to physically connect the listeners with the surrounding space... With a 24-hour programme consisting of sound and movement workshops... participative spatial performances ... inspirational lectures and talks, 4DSOUND seeks to embody the range of conscious states of the listener throughout the day, encouraging heightened awareness of the environment, deeper sense of mind-body connection, personal insight, creative expression, empathic sensitivity and social interaction.' (4DSOUND, 2015a)

Beginning with the work of Lisa Park, who is known for her work *Eunoia* (2013) in which she used an EEG headset³⁶¹ to capture her brainwave signals. These signals were then translated into sound and played through speakers fitted with water-filled discs. Within the discs, the water moves in ways that materialise a visualisation of Park's brainwave patterns (thoughts).³⁶² For *Circadian: 4DSOUND at TodaysArt NL 2015*, Park developed the site-specific work *Nue* (2015) in collaboration with technologists and the 4DSOUND team. For *Nue*, Park was inspired by the life cycle and metamorphosis of a silkworm (in Korean, 'nue' means 'silkworm') (see Park, 2015) and wore a 150 metre-long white dress that, as Park walked throughout the 4D system, slowly unfolded to create a cocoon-like woven structure that enveloped the audience (see Figure 32). At the same time Park weaved through the space of 4DSOUND's system,³⁶³ the artist also engaged her emotional consciousness to create real-time, relational and spatial mindscapes. Wearing a mobile EEG headset (specifically designed for *Nue*³⁶⁴), Park's brainwave signals were translated into live streams of sonic biofeedback – as *Nue*'s soundscapes externalised and amplified Park's momentary thought-emotions while she walked through the space of

³⁶¹ See Neurosky, 2016 for details on NeuroSky's 'MindWave Mobile Headset' used in *Eunoia*.

³⁶² See Park, 2013 for video documentation of Park's *Eunoia*.

³⁶³ For *Circadian at TodaysArt NL 2015*, the 4DSOUND system was constructed inside the space of the turbine hall at E.ON Electriciteitsfabriek, Den Haag. The space of the 4DSOUND system itself is approximately 20m x 12m x 5m. See Figure 31 to view an image of the 4Dsystem within the Electriciteitsfabriek.

³⁶⁴ The Muse EEG headset for 'Nue' was used alongside a mobile application called 'LISAx4D,' which was created by technologist Jihyun Lee. 'LISAx4D' enabled Park's brainwaves to be interpreted into specific categories of brainwave data, e.g., 'concentration, mellow, alpha, beta, delta, theta and gamma' (Lee, 2015, n.p.). The 'LISAx4D' mobile application was designed in collaboration with the 4D audio designers Salvador Breed and Stijn van Beek who linked the brainwave data with the 4D system, and this enabled Park's emotional states to be translated from internal biological infrasonic signals into spatial dimensional sound. See Lee, 2015, n.p. for descriptions of the specifications.

4DSOUND and interacted with the audience.³⁶⁵

Nue blends performance and the production of sound-affect together to sculpt a site-specific and real-time structure that is both physical and aural and able to bring the artist's interior *bodymind* into sonic relation with the personal and somatic domain of audience experience – thus creating new intimate inter-relational sonic spaces as Ouzounian (2006) describes in the previous section. *Nue* offers its audiences an immersive and theatrical experience of sculpting sound in space-time through the production of new affective sonic architectures that travel between cultural space-time (between Korean and Euro-American cultures) and unfold between the space-times of the interior of the artist's body, the bodies of the audience, the sonic architectures of the 4D system and the space of the Electriciteitsfabriek building (see Figure 32).



Figure 32: *Nue* (2015) [performance view] in *TodaysArt NL 2015, Circadian: 4DSOUND* Electriciteitsfabriek, Den Haag © Lisa Park. Photo: Georg Scholl.³⁶⁶

³⁶⁵ Park's own website describes *Nue*'s soundscapes as 'sonic textures [that] either melts together or fall apart depending on whether she is focused, distracted, or meditative.' See Park, 2015, n.p.

³⁶⁶ Images of *Nue* are shown in this thesis courtesy of the artist (Lisa Park).



Figure 33: *Nue* (2015) [performance view] in *TodaysArt NL 2015*, *Circadian: 4DSOUND* Electriciteitsfabriek, Den Haag © Lisa Park. Photo: Georg Scholl.

Along similar lines to *Nue*, artist Marco Donnarumma explores listening to the body and bodily process within live performance situations through using sensors and computer music software to create music from the infrasonic biological emergences of the body. Known for his performance series *Music for Flesh II* (Donnarumma, 2011-2012), Donnarumma has developed an interface³⁶⁷ that uses biomedical engineering and informatics to amplify a wide range of muscle 'sounds' (mechanomyogram or mmG) not audible to the 'naked ear' (Donnarumma, 2012, p.164). Donnarumma's performances create streams of dynamic and dramatically intense sounds from 'playing' the infrasonic signals of his body whilst in motion (see Figure 34).

For *Circadian* at *TodaysArt NL 2015*, Donnarumma worked with the 4DSOUND team to develop *0:Infinity* (Donnarumma, 2015), which is an immersive and interactive work that constructs an 'unstable and reactive architecture of infrasound vibrations, audible sounds and high-powered lights' (4DSOUND, 2015c, n.p.). Using 'Xth Sense' biotechnology (which amplifies the infrasonic signals of participant's blood flow, heart rate and muscle

³⁶⁷ Donnarumma's interface 'Xth Sense' is a performance biotechnology that Donnarumma developed using open source software and sensors that enables users to play their body's bioprocesses and movements as a musical instrument. Donnarumma joined together with new media artist Heidi Boisvert to expand the capacities of 'Xth Sense' to facilitate user interaction with mobile devices, music and video software, games and virtual reality. See Xth Sense, 2016, n.p.

contractions) together with the location tracking software 'Ubisense'³⁶⁸ (which enables the real-time location and interaction between participants to be fed back into the live unfolding development of *0:Infinity*'s audio-visual architecture), *0:Infinity* offers participants a unique interactive and immersive experience. Depending on the location and the level of interaction between participants, the visual and sonic architectures³⁶⁹ emerge from a pitch-dark silence to build into an almost overwhelming crescendo of flashing lights and intense bass vibrations that resonated the Electriciteitsfabriek building itself. The audio-visual architectures varied in intensity and shape and were a sonification of the unique cartographies of each participant's particular interactions with (flashing) light, sound, other participants and the time-space of the 4D system (see Figure 35). According to some participants' accounts, the experience created hallucinatory sensations.³⁷⁰

In this way, *0:Infinity* responds to Schrimshaw's (2013) call for a non-cochlear sound-affect because its generation of sonic environments is informed by the infrasonic microarchitectures that exist in-between people's bodies and surrounding architectural spaces through the agency of affective interaction (an interaction that creates zones of sound as 'intensities'). Yet, in contrast to Schrimshaw's (2013) advancement of non-cochlear sound, *0:Infinity* also produces new and unique inter-relationships between the affective flow of infrasonic signals within participants' bodies (which cannot be separated from emotional receptivity) and the flow of exteriorly generated sound effect.



Figure 34: *Music for Flesh II* (2011-2012) [performance view] custom-built XTH Sense bioacoustic sensors, computer, loudspeakers, subwoofers. © Marco Donnarumma. Photo: Marc Daniels.³⁷¹

³⁶⁸ For more information on 'Ubisense' technology, see Ubisense, 2016, n.p.

³⁶⁹ This term was described in Footnote 346.

³⁷⁰ During *0:Infinity* performances, only 3-4 participants were permitted at a time to enter the entire upper floor of the Electriciteitsfabriek where the 4D system was housed because the presence and movement people affected *0:Infinity*'s interface. While waiting to perform in another part of the Electriciteitsfabriek building, I spoke with some of Donnarumma's participants about their experiences because only those who participated in his performances were able to hear the full range of sounds produced by it. All participants I spoke with mentioned the effect/affect of audio hallucination – the sense that sounds they heard were coming from within their own heads, or that they felt the sounds were 'uncanny' – somehow out of sync with time and place.

³⁷¹ Image appears courtesy of Marco Donnarumma.

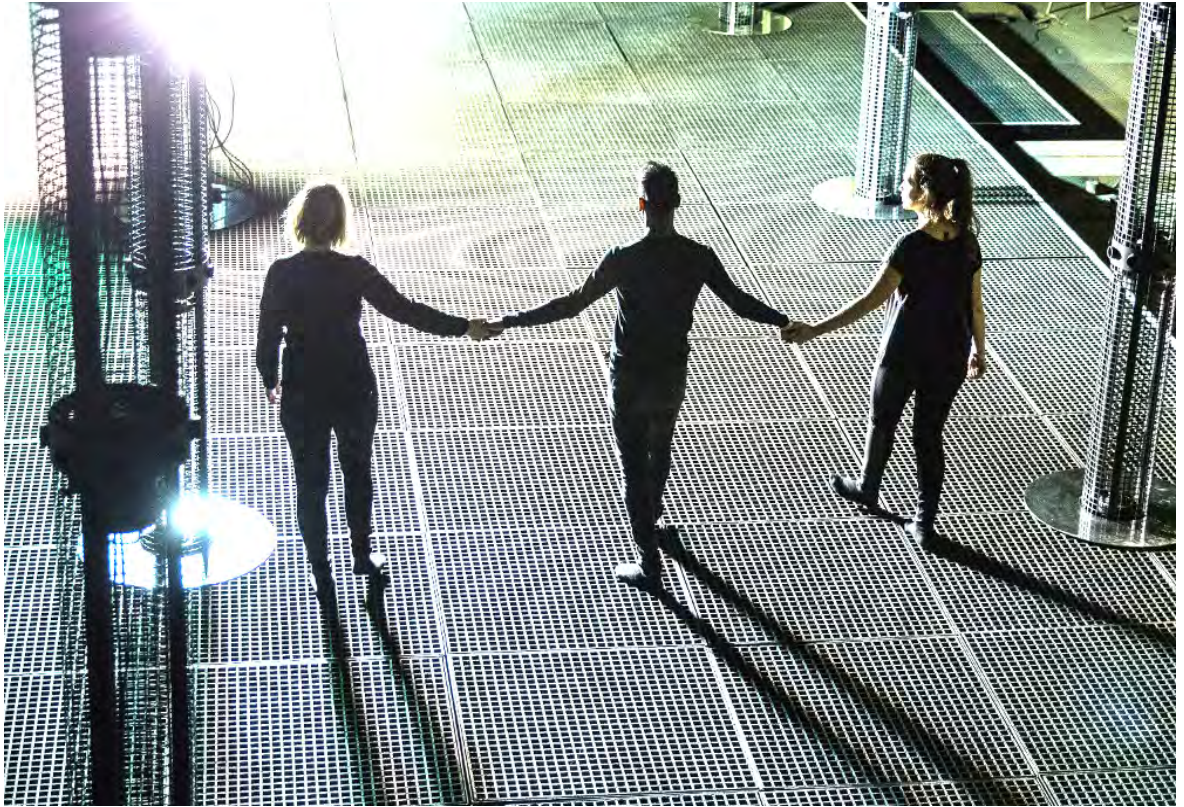


Figure 35: *0:Infinity* (2015) in *TodaysArt NL 2015*, *Circadian*: 4DSOUND Electriciteitsfabriek, Den Haag © Marco Donnarumma. Photo: Georg Schroll.³⁷²

Pulse Project was adapted for *Circadian* at *TodaysArt NL 2015* through developing a new haptic interface in collaboration with the Director of 4DSOUND, Paul Oomen (see Figure 36), which enabled me to perform my interpretation of participant's pulses almost immediately to a broader audience.³⁷³ Using a touchscreen controller, e.g., an iPad,³⁷⁴

³⁷² Image appears courtesy of Marco Donnarumma and 4DSOUND.

³⁷³ This was a major advancement on my earlier performances of *Pulse Project*. Rather than creating soundscapes by programming with SuperCollider (which was a highly private and labour intensive process), I could now respond to participants immediately and at the same time involve a wider audience by using a bespoke touchscreen audio interface that was connected with the 4DSOUND system. The 4D system is a 20m x 12m x 5m mobile structure that consists of twelve black columns, forty-eight high-density omnidirectional speakers, nine subwoofers and a black gridded floor and creates a unique immersive sonic environment.

³⁷⁴ 4DSOUND describe the role of the controllers in relation to the 4D system in the following passage: 'The controller... streamlines a huge range of control parameters in the 4DSOUND environment into 4 effect knobs per channel/sound source, enabling artists to play with key spatial attributes live during their sets, such as reverbs, spatial delays, spatial movement paths and on-the-fly looping of movements.' (4DSOUND, n.d[c]., n.p.) For *Pulse Project*, there were four effect knobs for each of the Five Elements. The effect knobs were programmed with the specific frequency and spatial sound sequence design 'expression' appropriate for each organ-element. This was accomplished through intensive discussions with Ooman and by developing the interface though experimenting with how the effect knobs produced certain sounds and spatial dynamics – according to my experiential understanding of the Five Elements. To this end, the effect knobs allowed me to translate my pulse-reading notations by adjusting the sonic shape, volume and temporal dynamics of the 12 organ-networks within a live environment.

and Ableton Live³⁷⁵ software that linked the interface made specifically for *Pulse Project* with the 4DSOUND system (as described in Footnote 373), I not only composed and broadcasted my interpretations of participants' pulse readings within a live sonic environment, but I was also able to translate participants' infrasonic body-dynamics into uniquely sculpted sonic architectures that corresponded to the metaphysical principles of Chinese medicine.



Figure 36: *Pulse Project* at 4DSOUND (2015) [digital image] 4DSOUND residency, Budapest, Hungary © 4DSOUND/ Michelle Lewis-King. Photo: Fanni Fasakas.³⁷⁶

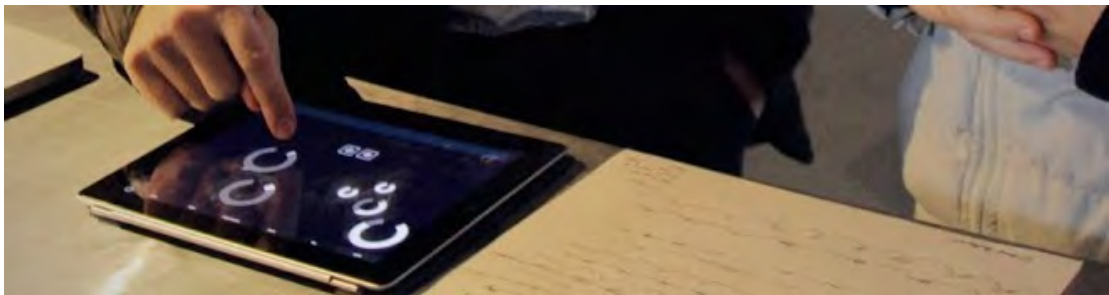


Figure 37: *Pulse Project - Five Element Interface* (2015) [detail of one page] 4DSOUND, Budapest, Hungary © 4DSOUND/ Michelle Lewis-King. Photo: Fanni Fasakas.

Pulse Project's and 4DSOUND's 'Five Element Interface' is a GUI³⁷⁷ that contains five pages representative of the Five Elements. On each of the GUI pages are a set of four main controls... two controls for each organ-network, making twenty controls overall (see

³⁷⁵ See the Glossary in appendix I for a description of this specialist software.

³⁷⁶ This image taken during my residency at 4DSOUND (Budapest, Hungary) shows director and founder of 4DSOUND Paul Oomen working with me to create a Five Element Interface for *Pulse Project* performances at *TodaysArt NL 2015 – 4DSOUND: Circadian*.

³⁷⁷ Graphical User Interface.

figures 36-37 showing Ooman and I working on one of the Five Element pages). Each control on the iPad GUI enabled me to also work with spatial sound via the Five Element Interface's connection with the 4D.Animator (see figures 38-39)³⁷⁸ – which made it possible to sculpt the unique dynamics of each participant's *zàng-fǔ* (according to their pulse notation) into real-time spatial sound within the architecture of the Electriciteitsfabriek (see figures 37 and 40).

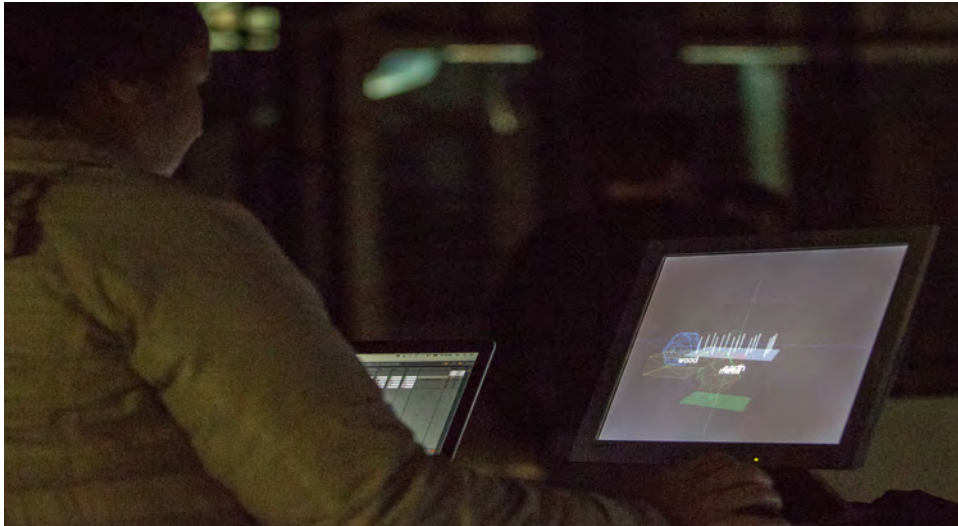


Figure 38: *Pulse Project – Circadian* (2015) [detail of performance] in *TodaysArt NL 2015*, *Circadian: 4DSOUND Electriciteitsfabriek*, Den Haag © Michelle Lewis-King/4DSOUND. Photo: Georg Schroll.

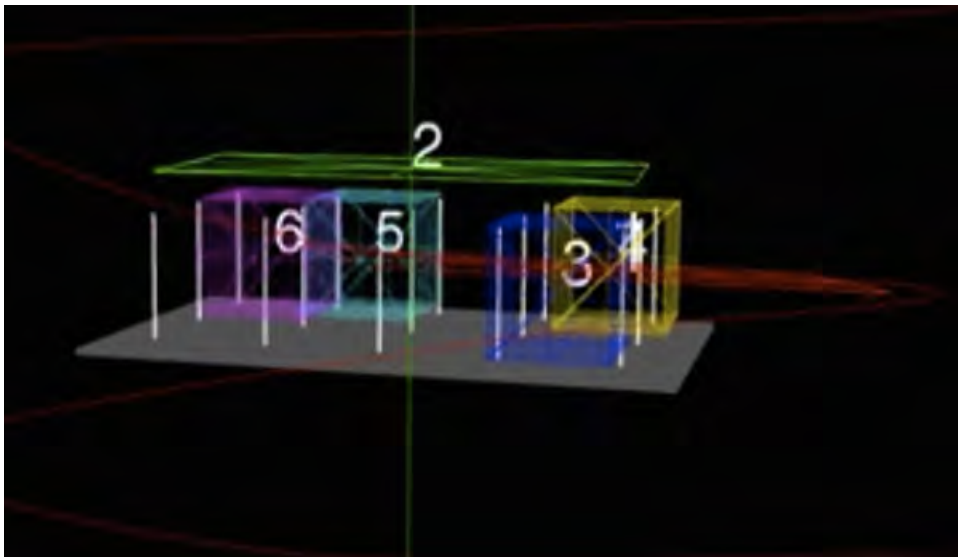


Figure 39: *4D.Animator* (2015) [screenshot detailing program view] © 4DSOUND.

³⁷⁸ The '4D.Animator' is a software tool that forms an integral part of sculpting with sound in the 4D system as it provides visual feedback (as an audio design animation) in real-time that shows how specific streams of sound are being directed within the system. 4DSOUND's description of the '4D.Animator' states it is: 'used on the one hand as a physics engine for modelling complex spatial processes, and on the other hand functions as a visual monitor of what happens with sounds in space while you are mixing in 4DSOUND' (4DSOUND, n.d[b]., n.p.). For a video demonstration of how this tool works and greater definition of its properties and capacities, see 4DSOUND, n.d(b)., n.p.

At the same time, I could respond to the presence of audience members by sending sounds to particular locations (see figures 40-41). This meant that I was able to give shape my impression of the unique rhythmicity of participants' infrasonic bodies and simultaneously wrap these sonic bodies around the bodies of audience participants as they walked through the spaces of the 4D system and the Electriciteitsfabriek building. Some audience members told me after the performances that they could feel the sounds both within their bodies and outside. Some felt their stomach vibrate, others their chest (I experienced vibrations in my bladder when playing the 'Water' frequency of 440) – so these sounds are not just auditory, but offer an immersive interior-exterior bodily experience.³⁷⁹ This created a body of sound-affect that was both interior and exterior, infrasonic and spatially dynamic... bodies of sound that were not simply heard with one's ears, but experienced with and throughout one's entire body-network.



Figure 40: *Pulse Sound Sculpture 11* (2015) in *TodaysArt NL 2015, Circadian: 4DSOUND* Electriciteitsfabriek, Den Haag © Michelle Lewis-King/4DSOUND. Photo: Georg Schroll.³⁸⁰

³⁷⁹ This aspect of my collaboration with 4D has potential for further research in terms of using sound to enhance health and wellbeing. At the time of writing this thesis, this aspect of this project (the interior-exterior generation and affect of sound in relation to the organ-networks) is a project that Paul Ooman, the 4DSOUND team and I aim to work on further in 2017-2018.

³⁸⁰ As the iPad interface communicated with the 4DSOUND system remotely, this meant I could also sculpt sound as I walked through the space of the 4D system. This picture shows audience participants listening as I compose a live pulse soundscape while mobile (the soundscape was composed using a notation of a participant's pulse taken a few minutes earlier).



Figure 41: *Pulse Sound Sculpture 14* (2015) [photo detail of audience participation] in: *Today'sArt NL 2015, Circadian: 4DSOUND* © Michelle Lewis-King/4DSOUND. Photo: Florence To.

These works developed for *Circadian* also correspond to particular historical works. For instance, Park's works (especially *Eunoia*) have a direct relationship with Alvin Lucier's (1965) *Music for Solo Performer* in which Lucier attached EEG electrodes to his forehead to capture alpha brainwave signals. The brainwave signals were translated and amplified into electronic signals strong enough to vibrate percussive instruments such as tympanic drums and symbols. Lucier's intention was to explore the phenomenological aspects of waves, i.e., the rhythmic nature of brainwaves and electromagnetic waves and how these infrasonic and invisible waves can be materialised through sound. In *Nue*, Park's innovation to Lucier's work lay in creating sound-affect relationships between her *bodymind*, audience members and architectural space as Park literally weaves her thoughts and her dress together around the bodies of her audience within the space of 4DSOUND's system – thus creating a unique weaving together of aural, cognitive and tactile architectures.

Whereas Donnarumma's work relates to Atau Tanaka's work with the *BioMuse* (Tanaka, 1997) project at Stanford³⁸¹ that enabled a performer to create a 'music of the

³⁸¹ *BioMuse* (Tanaka, 1997) was a biomusical interface developed by Hugh Lusted and Ben Knapp of BioControl Systems in conjunction with the Medical School and the Electrical Engineering

body' by amplifying and sonically modifying – in real-time – the neurological and muscular signals that are set off by physical activity. Donnarumma takes Tanaka's work further by creating an intensely theatrical experience for participants through combining his *Xth Sense* (a technology which is similar to *BioMuse* but its design is considerably more user friendly and also possesses a wider range of sonic effects³⁸²) with tracking technology to create a complex embodied sonic experience. *0:Infinity* dynamically combines biological and architectural feedback mechanisms to produce sonic architectures that are created or destroyed by the users themselves as they navigate the space of the 4DSOUND system. Therefore, what distinguishes *0:Infinity* from *BioMuse* and Park's *Nue* is Donnarumma's development of a technology in which the participants themselves actively co-produce the visual and sonic effects of the artwork through their affective interaction with each other and with *0:Infinity*'s sensors, software and audio-visual systems (see Figure 35).

Pulse Project draws upon works such as *The Handphone Table* (Anderson, 1979). In this piece, Laurie Anderson effectively creates a non-cochlear sound piece through using the body as a sonic technology – as the body itself is used to translate a set of infrasonic signals into an internalised soundscape through inducing vibration of the bones and cranial cavity.³⁸³ This piece creates an encounter that focuses the audience-participant's attention on listening to sound itself and on listening to ourselves as sound-producing instruments. At the same time, Anderson's work reconsiders the use of technology by repurposing the body to work in the same manner as a phone – by augmenting the body's ability to transport and transduce infrasonic signals into sound. Anderson's positioning of the human body as the central agent in the creation of technology-as-art in *The Handphone Table* is what *Pulse Project* likewise seeks to emphasize. Rather than placing the body in 'standing reserve' ³⁸⁴ to technology (to position nature and the nature of the body within the frame of the technological), Anderson's work focuses understanding on the human body itself as a technology that continuously produces both poetic and empirical meaning in the world.

Department at Stanford. Tanaka was the first musician to be commissioned to work with the interface (see FDL, 2000, n.p.). To view Tanaka giving a talk and performance with the *BioMuse* interface in 2008 at the STEIM Micro Jamboree, see Tanaka, 2008, n.p.

³⁸² In order to compare Donnarumma's *Xth Sense* with Tanaka's *BioMuse*, see Donnarumma, 2011, n.p. to view a video of *Xth Sense*.

³⁸³ Anderson's notes on *The Handphone Table* state that the: 'Powerful drivers which compress and amplify sound are embedded in the table. The listener can only hear the taped sound source by placing elbows in the depressions on the table's surface and covering their ears. Sound is conducted from the tape, through driver, screw, elbow, skull. The cranial cavities effectively become speakers' (Anderson, 1979, n.p.). For MoMA's description of Anderson's *The Handtable*, see MOMA, 2010, n.p.

³⁸⁴ This emphasis is a refrain of Heidegger's thesis (1977[1953]) on *Gestell* and the nature/technology relationship discussed in 'The Clinic, *Gestell* and Performative Practice' in Chapter Two.

Each of the embodied biomusical performances produced for *Circadian at TodaysArt NL 2015* discussed above creates unique immersive sonic expressions of the temporality and rhythmicity of being in place and time. *Nue*, *0:Infinity* and *Pulse Project* produce bodies of sound-affect that are non-cochlear, inter-relational and sculpturally dynamic... each perform a 'music' of biological emergences.

The critical difference between *Nue*, *0:Infinity* and *Pulse Project* is that Donnarumma and Park adopt biosensors and digital interfaces as their central instrument for recording and playing-back the body, i.e., the body stands *in reserve* to technology. Using sensors in this way functions much the same manner as the auscultation of the body via the stethoscope discussed in Chapter Three³⁸⁵ where digital mediation of the nature of the body is a predominant feature. Conversely, *Pulse Project* activates and utilises the processes of the human body to co-produce the technological affect/effect³⁸⁶ of the artwork. Although *0:Infinity* is closer to the aims of this project than *Nue* by creating soundscapes from participant's bodies and also by involving participants in the co-production of works, *Pulse Project* diverges from *0:Infinity* (and *Nue*) by reflecting upon – and making participants aware of – the technological mimicry of embodied processes as a part of its creative knowledge production. In other words, rather than simply produce immersive situations for audience-participants to react to; this project also raises consciousness about the role of the body in relation to technology as an integral part of the work.³⁸⁷

What makes *Pulse Project* unique is that it builds knowledge on the phenomena of embodied experience through using the body as an instrument of measure and interpretation. By using both human technology (touch) and cutting edge audio technology (with the body occupying a central role in the development of technology-as-art), human and digital technologies (when combined together) can offer new possibilities for experiencing and understanding noncochlear/infrasonic and invisible phenomenological processes in the lifeworld.

³⁸⁵ See: 'On Clinical Auscultation and Diagnostics.'

³⁸⁶ This use of technology is both affective – as the body interacts and responds to the work – and effective as the body itself actually *produces* the technological effect of the work – the sound.

³⁸⁷ The similarities and divergences in approach to developing these works were discussed by Park, Donnarumma, Paul Ooman (who chaired the discussion) and myself as part of the 'Musica Humana' panel discussion at *Circadian: TodaysArt NL 2015*. See figures 42-43.



Figure 42: *Musica Humana Artist Panel Talk* (2015) [photo] Panel from left – Michelle Lewis-King, Lisa Park and Marco Donnarumma. Chair: Paul Ooman. *Today'sArt NL 2015*, *Circadian* © 4DSOUND. Photo: Georg Schroll.



Figure 43: *Musica Humana Artist Panel Talk* (2015) [photo -audience view] *Today'sArt NL 2015*, *Circadian*. © 4DSOUND. Photo: Georg Schroll.

Listening to Listening: Aural Architectures

Pulse Project also advances a listening to listening itself (through listening with touch and through modulating soundscapes live³⁸⁸). Consequently, this section briefly discusses Maryanne Amacher's *Sound Characters: Making the Third Ear* (1999a) and Jacob Kirkegaard's *Labyrinthitis* (2007), as these works engage with auditory perception and the active production of sound that takes place within the act of listening itself. Beginning with *Sound Characters (Making the Third Ear)* (1999), Amacher described the process of her work in the following passage:

'When played at the right sound level... the tones in this music will cause your ears to act as neurophonic instruments that emit sounds that will seem to be issuing directly from your head ... audiences discover they are producing a tonal dimension of the music which interacts melodically, rhythmically, and spatially with the tones in the room... these virtual tones are a natural and very real physical aspect of auditory perception similar to the fusing of two images resulting in a third dimensional image in binocular perception ... I want to release this music which is produced by the listener.' (Amacher, 1999b)

Here Amacher describes how her work enabled listeners to actively produce new (and somewhat hallucinatory) sounds in response her soundscapes through the faculties of their own auditory perception. This phenomenon, called 'otoacoustic emissions,' is also explored in Kirkegaard's *Labyrinthitis* (2007) as a form of what Kahn (2008, n.p.) calls the 'two way traffic' of hearing. Kahn (2008) writes about *Labyrinthitis*'s process of producing otoacoustic emission by describing how Kirkegaard sits in a soundproofed room³⁸⁹ and listens to the sounds of his own body by wearing tiny microphones and speakers in his ears. At the same time Kirkegaard is listening to the sounds of his body through the microphones, he also has tones played into his ear through the speakers. In the act of hearing these tones – the artist's ear *produces* new tones in response. These new tones are relayed to an audience through multichannel speakers, which are installed on the ceiling of a domed space outside the soundproof room under which the audience is positioned. When the audience hears the tones produced by the artist's ear – this then produces a 'third' tone within the audiences' own ears (see Kahn, 2008, n.p.).

These works share a correspondence with my approach to using the body to produce a series of new sounds from the act of listening to sound (via touch). However, Amacher's and Kirkegaard's works are distinctly cochlear works, in that they actively use the cochlea

³⁸⁸ This process took place in *PULSE* as discussed in the section entitled 'Collaborations' in Chapter Four and also in this section when I describe how I was able to create unique live soundscapes at *Circadian: Today's Art 2015* through listening to the sounds as they were played live and also in 'seeing' the sounds via the 4D Animator.

³⁸⁹ This is in homage to John Cage's visit to the anechoic chamber in Harvard in 1951 where he thought he would be able to hear silence, but instead he heard the sound of his own body – a high pitch (his nervous system) and a low pitch (his blood circulating). See Cage, 1961, p.8.

as a technology to generate new sounds (not unlike Anderson's *Headphone Table*). However, this project places its emphasis on producing new sounds from the relationship existing between listening to non-cochlear sounds (via touch) and transposing these sounds into portrait-soundscapes that enable my participants to listen to the frequencies of their own bodies according to Chinese medicine theory (rather than focus solely on auditory perception and hearing with the cochlea). Furthermore, this project generates a tacit feedback loop between my listening to participants' pulses and composing soundscapes from participants' infrasonic body patterns – and participants' listening to my listening to them (by listening to a medico-sonic portrait of their body). The participants then respond by contributing new thoughts and comments, which are then fed back into this project as a form of knowledge production... as a co-produced subtext on the infrasonic aesthetics of this project.

Art, Science and Public Engagement

Another main aim of *Pulse Project* is investigating relationships between art, science and technology (AST) and using artistic practice to generate new interconnections between these fields of concern. This section therefore briefly³⁹⁰ explores projects engaging in similar forms of practice-based research that focus on aspects of clinical medicine.

I open discussion by stating that although *Pulse Project* researches relationships between artistic and clinical/therapeutic strategies and practices, the aim of this project extends beyond using artistic practice as a self-contained therapeutic (art therapy) deployed within a self-contained medical institution (the clinic).³⁹¹ Annika Lundgren adopts a similar approach to researching art and therapy (medicine) in her project *Performing Resistance* (2016) where she initiates a series of interdisciplinary seminars and workshops that focus on the concept of performing therapy as a form of political resistance. These workshops aim to explore how performing therapy could activate new social activism and meaning making. Lundgren writes:

'Contrary to this traditional function [using art as 'art therapy'], however, therapy may be used to identify and analyse social and political hierarchies and power structures or as a method of de-programming us from the rhetoric's of neo-liberalism, curing us from understanding ourselves as passive consumers, regaining our status as active citizens.' (Lundgren, 2016, n.p.)

³⁹⁰ This section examines specific practice-based relationships between *Pulse Project* and other artists' works and is therefore limited in its scope for generating an intensive discussion on the emerging field of art, (medical) science and technology overall.

³⁹¹ Besides referring to Art Therapy practice, I am also referring to the use of art 'on prescription,' which uses art as a self-contained therapeutic technique within the prescribed, i.e., already written, situation of the biomedical clinic. For an example of 'art on prescription,' see Harris, 2015, n.p.

Lundgren's position aligns with one of the aims of this project – to identify socio-political structures and hierarchies and to offer an alternative practice through performance and creative research production

Lundgren's project produces a variety of 'performing resistance' practices that use artistic practice to intuitively and critically respond to the dilemma of institutional hierarchies, thus creating a platform for social activism and change. Although *Pulse Project* performances provide a similar approach to Lundgren's *Performing Resistance* – such as researching relationships between artistic and therapeutic practices and using performance to create public situations for co-producing new knowledge that contributes towards social change – the aims and objectives of my research arise from within my own transdisciplinary experience of working across artistic and medical practices rather than responding as an artist to the concept of therapy as activism.

I further argue that creating significant social change from performing therapy-as-resistance would require longer-term commitment than producing a series of workshops. Creating social change involves assembling new communities and some form of ethical testing and analysing what types of changes have taken place – and also how these changes affect those within the new communities created. *Pulse Project* attends to this problem of evaluating the effects of social transformation through examining *Pulse Project's* participants' commentary and feedback. Therefore, without this deeper commitment to social practice beyond staging a series performances, I question whether Lundgren's project can deliver the social change she claims.

Similar to Lundgren's *Performing Resistance*, but from the perspective of researching the ways in which artistic method can inform medical practice, Beverley Hood has created *Eidolon: The Technological Body* (2013-ongoing), an interdisciplinary and participatory performance project the artist developed³⁹² in collaboration with the Scottish Clinical Simulation Centre (SCSC). For example, for *Eidolon*, Hood researches aesthetic aspects of clinical training, particularly the vast range of traumatic episodes the Patient Simulators (dummies) endure during healthcare training scenarios, such as how the simulators can 'die' over and over again, become feverish, how their 'skin' can be adapted to simulate all manner of wounds and traumas, and so on.

Hood has transformed standard biomedical clinical training scenarios by developing

³⁹² In terms of working across disciplines in a similar way to my own experience, Hood undertook multiple training sessions at the SCSC on medical techniques and interpersonal dynamics with patients (via patient simulators or 'dummies' in Hood's case – whereas I worked with patients under supervision in my clinical training). The difference in the training being that Hood is not directly responsible for patient outcomes and focused more on the 'role play' aspects of doctor-patient interactions. For further reading see Hood, 2013-ongoing.

new voices and situations that render the passive Patient Simulators into active and anarchistic actors that complicate medical training scenarios.³⁹³ To this end, *Eidolon* uses performative ventriloquism (as an artistic method) to enable ‘dummies’ to challenge trainee doctors towards ethically questioning their own authority within the therapeutic relationship. More particularly, the anarchistic performances in *Eidolon* allow for the current strictures of best clinical practice to occupy (if momentarily) a more marginal positionality within the clinical encounter. In confronting healthcare professionals to think poetically and theatrically about clinical scenarios, Hood enhances trainee doctors’ explorations of the doctor-patient relationship through enabling them to extend their ability to practice medical knowledge creatively whilst simultaneously developing their technical mastery of traumatic scenarios.

Thus *Pulse Project* and *Eidolon* use the ‘creative flow’ of artistic practice as a transversal method to rethink clinical practice. Both projects generate an ‘ethico-aesthetic’ (Guattari, 1995) disruption of the hegemony of the clinic in order to enable the construction of a more nuanced and equitable doctor-patient relationship – and also to investigate medical practice from a fresh perspective. Where *Eidolon* diverges from *Pulse Project* is that this project questions the biomedical episteme by intertwining Chinese medicine and art practices together to form an analysis of what medicine is and can do. Moreover, as this research is conducted in social settings, I am able to interact with participants and collaboratively produce knowledge within a broad public context, whereas *Eidolon* is self-contained within the training scenario of the clinic so its knowledge production is kept within communities that are aligned with clinical practice.

Artist-researcher Kaisu Koski³⁹⁴ has also studied the doctor-patient relationship and the medical body as part of her doctoral and post-doctoral research. Within this art-medicine context, like Lundgren, Hood and myself, Koski uses her artistic research as a social activist practice that seeks to contribute to the field of bioethics. To this end, Koski writes:

‘In my postdoctoral research project art is set in an instrumental position in a research project, aiming to unveil the medical body conception. In this project the artistic research methods and expression create a space in which imaginative scenarios and personal viewpoints are not only allowed but also necessary, and the views on what health and healthcare means can be analysed, criticized and fanaticized... the findings and reflections are both embedded in the same product, whether it is a publication on paper, screen or space.’ (Koski, 2011, p.124)

³⁹³ In one example of Hood’s performance training scenarios, the simulators are made to voice comments such as (in a highly offended tone): ‘Your are projecting onto me and what you want me to be, but I’m actually just a bit of plastic’ (Hood, 2014, n.p.). Hood uses the performance situation to present both playful and critically constructive scenarios for learning about doctor-patient relationships in order to create greater awareness. To view the full performance workshop, see Hood, 2014, n.p.

³⁹⁴ To view the impressive range of art-medicine oriented projects Koski has produced since 2007, see Koski, 2016, n.p.

Here Koski argues for a form of artistic research that can inform medical practice and widen the biomedical notion of the body - an aim that is also likewise central to my project.

Additionally, Koski aligns her methodological approach more with social science research than studio art research and argues that practicing artistic research in settings *outside* the context of art institutions provokes social change by simultaneously rethinking the function of artistic practice within society and also using artistic research to ethically rethink medical practice to contribute towards biomedical ethics (see Koski, 2011, p.124). *Pulse Project* works along these same lines by using artistic practice (outside of a studio art context) to provoke social change by conducting socially-engaged (participatory) performance art works that merge artistic research with Chinese medicine practice as a new methodology that ethically challenges current perception of what art and medicine can accomplish together in society. Moreover, *Pulse Project's* ability to effect social change is enhanced by creating and utilising participatory research methods³⁹⁵ to test, evidence and analyse the new understandings of art, medicine, the body and society that were co-created with participants within the performance encounter.

As *Pulse Project* and the projects mentioned in this section primarily investigate the body within a clinical context, doctor-patient relationships and bioethics, the works of medical anthropologists Anna Harris and Annamarie Mol are briefly mentioned here as they also provide new insights regarding the medical body and body-based knowledge creation. Starting with Mol's ground-breaking *Multiple Bodies: Ontology in Medical Practice* (2003), which comprehensively argues that knowledge about bodies is shaped not through *knowing*, but through practicing and interacting with bodies (Mol, 2003, p.vii). What is important in relation to this project is Mols' argument that learning about bodies happens *through* one's body as it relates to and others' bodies. According to Mol (2003), the performative practice of creating medical knowledge of the body produces multiple knowledges. For example, even doctors carrying out the same medical procedure will conduct the procedure in a variety of different ways each time. Mol suggests that 'no object, no body, no disease is singular. If it is not removed from the practices that sustain it, reality is multiple' (Mol, 2003, p.6).

Building on Mol's premise, Harris suggests that producing knowledge on the body is itself an embodied process that is predicated on touch and that diagnostic work is a craft that leads to the production of a skilled body (see Harris, 2016, p.37). Both Harris and Mol argue that medical knowledge of the body occurs through the development of the

³⁹⁵ These methods are: creating meaningful dialogues with participants within the performance encounter and also using participant questionnaires, feedback forms and email correspondences to give 'voice' to participants and facilitate the co-production of ethical knowledge of art, medicine and technology.

practitioner's own 'skilled body.' This skill develops over time through the performative practices of training and through the feedback loop of touching and listening to others' bodies. To this end, Harris argues that the body is trained to sense - to be 'sensible' (Harris, 2016, p.37). Together Mol and Harris reconfirm the point I have already argued throughout this thesis - that the body is itself a technological instrument.

Overall *Pulse Project* positions itself in accordance with the examples of art-medicine research outlined in this section. However, what makes this project unique is that this project adopts the strategies of the CM clinical encounter to provide a contrast to allopathic medical practice that therefore creates new thinking on:

- The patient-doctor relationship.
- Conceptions of the medical body.
- The artistic (what Harris calls 'crafted') aspects of diagnosis.
- Perspectives on technological body, e.g., the body as a technology and producer of knowledge.
- The performance of medicine itself.

Another way this project diverges from those mentioned in this section (with the exception of Hood's *Eidolon*) is that the patients themselves and their bodies are not sufficiently addressed in the research projects mentioned above. In other words, patient or participant experience is not an active part of the work.³⁹⁶ For *Pulse Project*, I have made every effort to include (given ethical approval) research participants' experiences and responses and I also elaborate upon the ways each participant is a co-producer of knowledge in this project.³⁹⁷

Furthermore, as biomedicine almost exclusively focuses on resolving pathology as its central purpose – a practice that has 'dominated health care for the past century' (Wade and Halligan, 2004, p.1398),³⁹⁸ this project uses artistic research to generate a new form of clinical encounter by performing medicine as a practice that focuses on creating wellbeing through social transformation as its 'therapeutic response.'³⁹⁹ In other words,

³⁹⁶ Most likely this is because there are significant barriers to researching doctor-patient relationships in medical research. Ethics committees are necessarily extremely cautious when it comes to working with human subjects.

³⁹⁷ The aspect of co-production of knowledge in this project is outlined in 'Participant Engagement and Feedback' and 'Collaborations' sections in Chapter Four.

³⁹⁸ See also MacDade-Montez, 2014, p.28; Eliopoulis, 2010, pp.ix-x; Sobo and Loustaunau, 2010, p.152 for discussion on the biomedical model of health and its focus on illness.

³⁹⁹ There are two additional examples of creative clinical encounters that are less related to the central aims of this project, but are mentioned here because they are interesting examples of the recent trend in rethinking the functionality of the clinical encounter, i.e., away from identifying disease towards creating wellbeing and social transformation. The first example is Natalie Jeremijenko's, *Environmental Health Clinic* (EHC), a multifaceted and multinational project that 'develops and prescribes systems that improve local human and environmental health' (EHC,

this project ethically rethinks biomedicine practice by initiating new socio-philosophical encounters where meaning (healing) takes place through practitioner and participant co-producing new interpersonal and embodied understandings of being and being-well.

Chinese Medicine as Art

At the time of writing this thesis, the interest in exploring CM as an artistic medium is beginning to emerge, but discourse surrounding this theme is negligible and so this section offers a brief identification and analysis of CM art projects. Consequently, this research area presents rich potential for further research for both myself and for other researchers.

Recent projects that point to the emergence of CM as medium of socially-engaged artistic concern can be evidenced in the *International Art Fair, Survival Kit 8, Social Acupuncture* in Latvia in September 2016. The press release states:

'This year in response to observations and current affairs, the festival will focus on the acupuncture of society, viewing our modern day society as a body, searching for and locating its most painful points.' (LCCA, 2016, n.p.)

The project curator refers to her use of acupuncture for the festival 'as a metaphor for testing the sensitive societal zones' (see LCCA, 2016, n.p.), thus giving further social contextualisation for my own investigations into CM as an emerging creative methodology for social change. Along similar lines, in Carissa Rodriguez's series of photographs, *It's Symptomatic/What Would Edith Say?* (2016) Rodriguez has had her acupuncturist diagnose pictures of other artists' tongues⁴⁰⁰ to ask the question:

'If what is at stake in the production of art is not the image of beauty but the "promise of happiness," what could be the correlation between good health and good taste, bad health and bad taste?' (Rodriguez, 2015, n.p.)

Without entering into the artist's meaning here, in terms of this project, what is intriguing is that a CM technique is being used within artistic practice to pose questions about the body

2016, n.p.). Jeremijenko's citizen science projects assign those who come to her clinic a particular creative science task that positively transforms the local environment. For example, one client occupied the disused parking spaces in front of city fire hydrants (by removing the tarmac) and grew a guerrilla garden there instead. EHC citizen projects are too numerous and detailed to be adequately described here. See EHC, 2016, n.p. for further reading. The second example presents a more anarchistic flair to the dispensing of prescriptions. *The Art Surgery* (2009-2010) states that it offers a solution for the problem of an increasing workforce of Doctors of Art by providing a clinic for artworks-as-patients. This provides artist-doctors the possibility of 'treating paintings and artefacts as patients' (The Art Surgery, 2009-2010, n.p.) – where Doctors of Art provide solutions to ailments such as 'Poor Composition, Tonal Problems, and Disharmonies of Colours' (The Art Surgery, 2009-2010, n.p.). See The Art Surgery, 2010, n.p. to view examples of 'art patient' notations.

⁴⁰⁰ To view images of *Its Symptomatic*, see Rodriguez, 2015, n.p.

and society (albeit obliquely)⁴⁰¹ – a similar gesture to the ‘Social Acupuncture’ premise mentioned above, but from a more individualist angle.

In terms of Chinese artists who work with CM as a medium of socio-cultural critique, I found only a few artists in my research; and in some cases, the information I obtained was limited as I am not fluent in Mandarin. The most visible work in this genre is Chen Zhen’s *Crystal Landscape of Inner Body* (2000), in which the artist created twelve organs from (crystal) blown glass. These organs are an amalgam of Eastern and Western approaches to the body within medicine and also represent the interior/exterior relationships between the body, culture and society. Zhen writes: ‘The external landscape is reflected in the crystal surface of the interior landscape of the body, underlining the relationship between internal and external causes, between the human body and society’ (Faurschou Foundation, 2016, n.p.). The twelve organs in glass share a correspondence with my soundscape ‘sculptures’ of participants’ twelve organ-networks – as both act as hinges between art and science and between global cultures of embodiment... both materialise the invisible body of Chinese medicine.

Similarly, Xiao Lu’s performance: *Tang Poem. Chinese Medicine. Copying. Time.* (2011) explores the activity of producing artworks as a method for generating or practicing health. These performances enact a meditation on medicine, on aesthetic wellbeing and upon time itself. In Lu’s performances, the past (the Tang Dynasty poem that contains poetic reflections on medicine) coexists with the present. This moving between time-spaces occurs when Lu copies the ancient poem within the contemporary situation of the performance. Lu also uses Chinese herbs as aesthetic-medical objects in her performances. She describes this performance in the following passage:

‘I copied out a Tang poem using Chinese medicine for oral administration that I had to hand. Continuing to copy Tang poetry for several successive days, I experienced a feeling of physical and mental well-being, so I decided to continue for 365 days in order to copy out the entire Three Hundred Tang Poems. As a matter of personal discipline, I would take with me, wherever I travelled, the Tang poetry, Chinese medicine and letter-writing paper.’ (Lu, 2011, n.p.)

Chen and Lu are most likely the visible edge of a much larger hidden (to a non-Chinese researcher) community of artists that – over the span of at least a millennia – have been working with CM as a medium for creating aesthetic knowledge on the nature of the body

⁴⁰¹ Rodriguez states that if ‘bodily functions are to be imagined as computer functions,’ CM diagnosis of the tongue ‘is something like a screengrab of the artist’s internal state’ (see Rodriguez, 2015, n.p.). Because this work uses a form of cultural appropriation (CM diagnosis) to create dialogue about the ‘state’ of the artist, from my perspective, it comes across as superficial and as a form of exoticism. These images could be instead used to explore the deeper potential of what such mapping of the body signifies - not only for the artist, but to expand current understandings of the human body. What then might these images say aesthetically, medically, socially about contemporary (global) identity? Rodriguez misses the opportunity to ask these questions - whereas this project inquires into these questions very deeply.

(and embodied being-in-the world) and for creating knowledge practices that cross the boundaries of time-space.⁴⁰²

At the beginning of this section I identified the exploration of CM techniques within artistic practice as an emerging global trend, occurring in the US, Latvia, China and the UK so far. Additionally, by interconnecting Eastern and Western approaches to art, medicine and technology, this thesis has created a new area of intercultural and transdisciplinary research. By conducting unique research in this new emergent area, this thesis thus identifies the ethico-aesthetic development of CM to be an important area of further development due to its potential to connect personal, historical, cultural and disciplinary practices together in novel and *nonmodern*⁴⁰³ ways.

⁴⁰² As I could find only two Chinese artists working with CM as an artistic form of medicine, in order for this project to become comprehensively transcultural, the future direction of this research therefore will focus on Chinese artists' work (both historic and contemporary).

⁴⁰³ Latour uses the term nonmodern (1993, p.47) as a solution for one of the main problems modernity put into practice, which is the creation of false distinctions between oneself and others, Western cultures and other cultures and between nature and society. Latour uses nonmodern to develop the notion of a 'Parliament of Things' (1993, p.142) whereby objects are not seen as separate but in interactive relation.

6. Conclusion

Preface

This chapter concludes this thesis by reviewing *Pulse Project's* contributions to knowledge in the first section and assessing its limitations and future potential in the second section. The last section brings this thesis to a close by offering final reflections on this project overall.

Findings and Implications

Although transdisciplinary research describes the central form of knowledge production of this thesis, my approach to transdisciplinary research is not one of posing a unitary research question (that acts as a boundary object between disciplines) in order to produce a singular contribution that transcends the original disciplines informing the research.⁴⁰⁴ Instead this project asks four main questions⁴⁰⁵ and uses artistic research to investigate these questions *across* disciplinary and cultural practices to produce syncretic and multimodal layers of inter-relating knowledge.⁴⁰⁶ Accordingly, in this section, I articulate this project's transdisciplinary contributions through discussing them within four main categories: art, medicine and technology, intermediality, practice-based research and sound studies.

Art, Medicine and Technology

This project responds to the four main research questions posed in the Introduction by adopting transdisciplinary and practice-based research methodologies⁴⁰⁷ with which to provide new perspectives on the inter-relationships between the body, art, medicine, technology and culture. Taking the feminist readings of science and technology studies discussed in Chapter Two as a point of departure, this project works across art, medicine and technology fields as a means for bringing 'hand, brain and heart' together (Rose, 1983) to create a new approach to knowledge production as a 'successor science' (Harding, 1983; Barrett, 2014, p.3; Lykke, 2010, p.19). This approach arises from adopting

⁴⁰⁴ As I have already argued in the Introduction and Chapter One – See pages 9-10, 20-23.

⁴⁰⁵ A synopsis of the research questions are: a) How and what is a body? b) How does *Pulse Project's* reworking of the relationships between the body, art, science and technology practices contribute new knowledge? c) What new understanding of contemporary practices (contemporaneity) might be discovered and created by researching premodern medicine (CM) in relation to the current art, medicine and technology practices? d) How does situating *Pulse Project's* participatory performances within a social context create new knowledge?

⁴⁰⁶ This is also described in Chapter One. See pages 26-28.

⁴⁰⁷ It is important to point out that although discussed as two separate categories in this section, transdisciplinary research (as a research approach) and practice-based research (as a method of investigation) are comprehensively entangled together within the knowledge production process of this thesis.

practice-based artistic research as a method that can ethically reflect upon science and technology practices.

Pulse Project's practice-based methods each produce unique forms of embodied knowledge by using the body (and its perceptual intelligences) as a research tool.⁴⁰⁸ More specifically, in my performances I use diagnostic touch (a scientific method) as an artistic research methodology that enables a transdisciplinary exploration of medical, technological and culture knowledge from *within* the site of the body. Human touch interconnects mind and body – thinking with feeling. It blurs the clear distinction between researcher and research participant. Consequently, the practice-based methodologies utilised in this project have allowed me (as the researcher) to produce unique knowledge from being directly and physically engaged with the questions of my research.⁴⁰⁹ This approach uses the body together with artistic practice to concretely materialise the tacit, sensorial, processual and experiential aspects of research investigation – as methods that reveal hidden knowledges embedded within the body's interactivity with and co-production of the lifeworld.

Pulse Project's practice-based methods also use the body to interweave artistic, medical and technological strands of research production into a new set of integrated ethico-medico-aesthetic practices.⁴¹⁰ An example of this is evidenced by the manner in which CM pulse diagnosis is utilised within this project – as an artistic-medical method that offers research participants a contrasting experience to the biomedical model. Instead of palpating the radial artery with the index and middle fingers and counting beats per minute to determine the patient's resting heart rate and contextualising the patient's vital signs into a lexicon of pathology (as is standard practice in biomedicine), this project utilises CM pulse analysis to demonstrate a more intricate and aesthetic approach to medical interaction than simply performing a quantitative analysis of the pulse. This is because CM pulse analysis includes spiritual consciousness and somatosensory perception within its technological framework for measuring and interpreting bodily processes.⁴¹¹ Thus Chinese pulse diagnosis is applied and adapted in this study to blur

⁴⁰⁸ This recalls Mol's (2003) discussion of the body itself as an instrument of medical practice in Chapter Five, pages 154-155.

⁴⁰⁹ Henk Borgdorff (2012) argues that artistic practice's subjective-relational approach to research creates a challenge to the notion of scientific objectivity within conventional research. This challenge arises from the fact that artists 'are intimately intertwined with what they are exploring' (Borgdorff, 2012, p.80), and it is this entanglement between researcher and research objective within artistic practice that provides a unique approach to knowledge production. Moreover, artistic research enables the production of unexpected, original and process-related results (see Borgdorff, 2012, p.80).

⁴¹⁰ Here I adapt Guattari's term 'ethico-aesthetic' (Guattari, 1995) – which was discussed previously in the section entitled: 'Transversal Relations and Ethico-Aesthetic' in Chapter Five.

⁴¹¹ The spiritual and perceptive aspects of medical practice that I refer to here are discussed in

clear distinctions between artistic, ethical and medical practices. By using Chinese pulse diagnosis *as an art* – I converge medical and artistic investigation together into a new integrative practice that informs and widens the scope of current medical practice.⁴¹²

Another transdisciplinary methodological innovation includes my notations, which are produced to both materialise new forms of embodied knowledge and also in resistance to techno-accelerationism within medical practice⁴¹³ – particularly the scientific capture of natural phenomena, i.e., generating images and cartographies using the latest techno-mechanical ‘advancements.’⁴¹⁴ In my notations and soundscapes, I use a (sustainable) premodern approach that integrates human intuition, creativity and somatic intelligence into the process of producing scientific knowledge – which transforms understanding of what science can do or become. My notations extend the function of scientific inscription to become all at once an artistic drawing, a portrait, a medical notation, a musical score and a return to embodied forms of knowledge production. This project thus uses a premodern approach to unite hand, heart and mind to produce a successor-science imaging of the body. This approach enables the capture of the entanglement of analytical structures (epistemology) with the complex, unexpected, novel and contingent aspects of live phenomena (ontology). Moreover, my notations further extend the standard function of scientific imaging by producing *meaningful* (ethico-aesthetic) medical images of the nature of the body – rather than simply producing technical images on the pathological condition of the body.

By adapting CM clinical practices into new research tools that enable the performance of a transdisciplinary investigation and reorganisation of the relationships between art, medicine and culture, *Pulse Project* subsequently fulfils one of the central aims of this research – to simultaneously refresh current understanding of the body whilst producing new ethical and aesthetic meaning across art, medicine and technology practices. This transdisciplinary ethos was first informed by my experiences of the CM clinic.

CM theories and methods are themselves a convergence of poetic, ethical⁴¹⁵ and

greater detail in Chapter Three, in the section ‘The Clinical Encounter as Sculpting Process: Zhèng, Shén and Yì.’

⁴¹² Suggestions for ways in which *Pulse Project* informs current medical policy (particularly medical training policy) have been discussed on pages 24-26.

⁴¹³ Discussion of how this project resists techno-medical accelerationism is discussed previously on pages 41-42. Also, the mechanical production of objectivity in relation to my notations was discussed on pages 93-94.

⁴¹⁴ The notion of ‘advancement’ and acceleration are used here to refer to the modernist, futurist and techno-utopianist narratives of societal progress that privilege the agency of techno-mechanical production in advance of (slower) eco-sustainable forms of production. For discussion on this theme see Morton, 2016, p.8.

⁴¹⁵ Here I am referring to both Guattari’s ethico-aesthetic mentioned in the footnote above (which uses the free-flow of art to open new approaches to problems) and the medical practice of ethics

technical forms of medical investigation. Professor Volker Scheid makes this clear in *Chinese Medicine in Contemporary China* (2002) when he writes:

‘[Dr Zhu] is an accomplished painter who never fails to impress on his students... the close relation between medicine and art. He frequently recounts how his ability to paint... provided him... with dexterity and an ability to look at things simultaneously from different perspectives.’ (Scheid, 2002, p.139)

Here Scheid calls attention to how Dr Zhu’s blending together of artistic and medical strategies enables physicians to formulate more effective treatment strategies. This is because when one system ceases to provide solutions, another system can be used to reconsider the problem from a different perspective. Consequently, it is this weaving together of artistic and medical knowledges as a method for providing fresh approaches to treatment strategies in the CM clinic that informed my development of a transdisciplinary project that can move between practicing medicine as an art – and practicing art as a medicine.

Accordingly, *Pulse Project’s* performances of CM clinic serve to create a theatrical space that activates the transvaluation of art and medicine. By performing CM clinical practices within the public domain, this project utilises the performative element of the medical encounter as a method of social engagement. Through collaboratively investigating aspects of CM clinical practice with participants of this research, such as pulse analysis, rapport-building, case history consultation and notation, my restaging of the clinic subsequently widens the unidirectional aspect of diagnostic listening and inscribing processes to include co-creative and co-productive dimensions. This co-productivity is evidenced by participants’ commentaries and also within the collaborative works that were produced in response to this research project.⁴¹⁶ This aspect of the work creates new cartographies or ‘relationscapes’ (Manning, 2009) between others and myself and between disciplinary practices.

Lastly, by combining CM techniques and theories with audio technology, the notations and soundscapes communicate my research findings on the unique rhythmicity of participants’ living bodies. Consequently, *Pulse Project’s* soundscapes, notations and the transdisciplinary production of knowledge contained within this thesis create greater intercommunication between traditional Chinese and modern Western (Euro-American) approaches to the medical body. By creating notations and soundscapes based on CM readings of the body that are also intended as art-medicine prescriptions, a transversal⁴¹⁷

that seeks to continually question current practice in order to find better solutions regarding the care of others.

⁴¹⁶ See the sections in Chapter Four entitled ‘Participant Engagement and Feedback’ and ‘Collaborations.’

⁴¹⁷ See ‘Transversal Relations and Ethico-Aesthetic’ in Chapter Five for a definition of

discourse is opened between the realities of medical practice, creative problem-solving and aesthetic reflection.

For example, the artistic exploration of *zhèng* (a CM concept of the body-as-interface),⁴¹⁸ exemplifies the way in which art, medicine, technology and culture intercommunicate within this project – as both the subject (investigating the body as an interface), and the objective of the study (producing knowledge as an interface), work together to create new inter-relational forms of research analysis and knowledge production. Each pulse analysis output, whether in the form of a notation or algorithmic composition, provides a multi-layered interpretation of the interior-exterior spaces of the body and also describes the inter-relationship between oneself and others and between ancient and contemporary medical cultures. These pulse reading knowledge-complexes (the notations and compositions) are then materialised into polyphonic bodies of sound – dynamic aural architectures of knowledge that sonically interact with the time-spaces of audiences' bodies and surrounding public environments.⁴¹⁹

Pulse Project uses the process of artistic research together with medical analysis to both materialise tacit knowledge and produce new ethico-medico-aesthetic practices. Moreover, *Pulse Project's* practice-based investigations and outputs produce transdisciplinary and polyphonic cartographies of knowledge that generate new readings and soundings of the body, interpretations that in turn reveal unique perspectives on the interplay between the body, medicine, technology and society.

Pulse Project Performances and Intermediality⁴²⁰

Pulse Project adopts performance⁴²¹ as a medium that can assemble knowledge production into multiple cross-influencing layers. This is accomplished through the development of 'intermedial relationships' (Groot Nibbelink and Merx, 2010, p.220) within the performance encounter. Chiel Kattenbelt defines 'intermediality' within the context of performance as: 'those co-relations between different media that result in a redefinition of the media that are influencing each other, which in turn leads to a refreshed perception'

'transversal.'

⁴¹⁸ See pages 76-77 for my discussion of this concept.

⁴¹⁹ For an account of how these relationships are materialised in sound see pages 102-103, 113-119, 142-148.

⁴²⁰ *Intermediality* describes the interactive communication and mutual influence that exists 'in-between' or 'within and between' different media. Whereas *multimedia* is the combination or co-presence of different media and *transmedia* describes media that have changed from their original form as a result of being mixed together with other media. See Kattenbelt, 2008, pp.22-25.

⁴²¹ In the context of this section, 'performance' serves as a vehicle or 'hypermedium' (see Kattenbelt, 2006, p.32) that contains within itself a variety of creative media, such as graphic notations, SuperCollider compositions, participant conversations/feedback and live performances of pulse soundscapes via multichannel systems.

(Kattenbelt, 2008, p.25). This is precisely what this project accomplishes. Within *Pulse Project* there are many layers of intermedial communication. For example, intermedial communication occurs in this project both *internally*, i.e., within the performance encounter itself, and *in-between*, i.e., between the creative outputs and the analysis of these outputs within the contextual research layers of this thesis. Hence this section describes the diverse medial layers contained within *Pulse Project* and how mutual interactions between the various media contained within this project in turn gives rise to new experiences, conversations and approaches to knowledge production.

Beginning with the intimate space of inter-personal communication that characterises the pulse-reading performance encounters, both touch and conversation (particularly the renegotiation of personal knowledge between myself and participants) are used within the performance as methods for creating a relational time-space where knowledge can be shared and co-created within the immediacy of the moment. This is the first layer of intermedial communication (see Nelson, 2010, p.19).

The secondary layer is the intermedial movement of knowledge between discourses (see Bal, 2002, p.3-11; Groot Nibbelink and Merx, 2010, p.219). In this project, knowledge moves between one disciplinary context to another, between one culture and another and also between premodern and postmodern time-spaces. For example, in one instance I perform a premodern CM technique. I then translate⁴²² the resulting pulse analysis data into an algorithmic program-composition. The algorithmic composition is translated again – via communication between audio software and multichannel speaker systems – into spatially dynamic arrays of digital sound. This demonstrates the intermedial movement of knowledge production across disciplines and practices in this project

The third intermedial layer occurs during the playback of the soundscapes, either via headphones, or via immersive multichannel environments. In this layer there is intermedial communication between embodied human experience of space-time and machine-generated time. By designing digital bodies of sound to inter-relate with human bodies within specific environments, this cybernetic process creates and intensifies attentive focus on our own human bodily processes (see Scheer, 2010, p.120-121). In this way, the intermedial human/machine time-space relationship creates a heightened awareness of the complexity of our own embodied temporal perceptions as well as enhances our embodied relationality with the lifeworld.

Lastly, the fourth layer of intermediality occurs between the diverse medial layers within the overall project. This form of intercommunication creates a series of complex feedback loops that circle and interconnect as 'input' and 'output' modes throughout this thesis. For

⁴²² Using programs such as SuperCollider or Ableton Live. See the Glossary for definitions of these programs.

example, I initiate pulse consultations within the performance encounter as an output (of this project). The resulting pulse analysis and case study conversations form inputs for participants. The participants affectively respond to these inputs both during the immediate situation of the performance encounter and afterwards when listening to their own personalised soundscapes. As part of the research process, participants are invited to give their responses (outputs) on the performance encounter and soundscapes, which are then received and analysed as inputs within this thesis. Thus the input-output feedback loops described here characterise the types of intermedial movements taking place between people, disciplines, cultural time-spaces and creative media within this project... movements that enable the development of new experiences, co-relations and multimodal transdisciplinary knowledge production to take place.

Practice Based Methodology

Pulse Project has produced a new series of relational tools and interfaces, such as touch (used as a method for connecting oneself with others and for listening to non-cochlear sound), SuperCollider (used to exteriorly express the body's interior twelve organ-networks) and the development of a new haptic interface in collaboration with 4DSOUND that allows me to play my interpretation of people's pulses in live sonic architectural environments.

Subsequently, *Pulse Project* produces unique practice-based methods for touching and transposing sound by adopting a premodern methodology in tandem with cutting edge audio technologies to create new immersive experiences for:

- Experiencing the interplay between infrasonic and sonic embodiment, e.g., the experience of having one's pulse read and then listening to the pulse soundscape.
- Experiencing the interplay between human and digital bodies of sound.
- Experiencing an alternate cultural construction of the body in sound, e.g., representing participants' bodies in sound according to CM theory.

This project also uses practice-based research (PBR) to activate transdisciplinary layers of investigation that intercommunicate to produce multidimensional knowledge. This is evinced by the manner in which healthcare and social science methods and documents, such as diagnostic analysis and case studies, are reconfigured for this project. For example, the 'Participant Feedback Log' specifically demonstrates how PBR can bridge disciplinary practices by using artistic practice to act as a boundary object between healthcare and social science research methodologies. The feedback log is a qualitative research method normally practiced in social science and healthcare studies as a 'follow-up' process for research trials to increase the effectiveness and accountability of

a particular intervention.⁴²³

This study adapts a science-based qualitative research method into an artistic PBR method to bring scientific aims (to improve effectiveness of the intervention) and artistic aims (to reflect on the aesthetic significances of an intervention) into intimate communication. To this end, I have developed the 'Participant Feedback Log' as an art-science method that records participants' receptions of the performances and soundscapes by responding to the questions asked in the 'Participant Questionnaire,' which enables participants to offer their particular reflections on the interplay between artistic, medical and technological practices within this project. This approach to using PBR demonstrates Leavy's argument that PBR methods can reveal the complexity of experience within social situations in ways that standard qualitative research is unable to produce (see Leavy, 2012, p.106).

By using performance as a methodology that creates social debate on the body's relationships with science and technology practices, *Pulse Project* performances and sound installations produce new understanding through interpersonal exchange of perspectives on these topics. New understanding is also created through my sonically mapping each participant's body according to CM in order to provide new experiences for listening to and speculating upon 'how and what the body is and could be.' Moreover, by engaging with participants' experiences and expectations of biomedical pulse analysis and auscultation practices – and adding my own artistic interpretation of CM and Chinese traditional music practices to their experiences of these medical practices – participants' understanding of medical inquiry can then be opened out to include listening to the body's biorhythms as a unique musical process. At the same time, this transdisciplinary performance of practices traverses across the (false) divisions between premodern and modern medicine and between medicine and art to create complex intercommunications between these coherences.

Thus the pulse reading performances, notations, algorithmic compositions, haptic interfaces, sound installations, headphone pieces, participant discussions, feedback, email commentary and collaborations developed for *Pulse Project* are all brought together to both facilitate transdisciplinary investigation and to produce novel social practices and experiences for exploring and conceiving of the body and clinical encounter.

Sound Studies

This research utilises soundscapes and multi-channel installations to examine the

⁴²³ See 'Research Fundamentals: Follow-up of Subjects in Clinical Trials: Addressing Subject Attrition' by Woolard, et al., 2004, pp.859-866.

relationships between the body, sound and listening. Each soundscape transmits a range of sound-waves that suggest a listening to others and 'otherness.' Sound is used in this study as an instrument that produces a translation and transmission of a particular zone of 'listening' between beings, cultures and technologies. This is accomplished by adopting Chinese medical and musical theories regarding the phenomenal architectures of the body (and its relationship with its environment) as resources for creating soundscapes that challenge and reconfigure modern and contemporary notions of the body. *Pulse Project* thus uses human diagnostic touch as a technology that produces an embodied translation of participants' infrasonic interior bodies into person-specific and architecturally dynamic bodies of digital sound... it also uses sound as a transdisciplinary medium that parses and reorganises artistic, medical, technological and cultural knowledges into new listening experiences.

Pulse Project soundscapes create new aural architectures of 'relational listening' (English, 2015) – through listening to the body of others, listening to the cultural practices of others and listening to the act of listening itself. The participants in this research *become sound* by first being conceived of and listened to as infrasonic entities during the processes of pulse analysis and composing each soundscape. Participants then listen to themselves as bodies of sound during the playback of my interpretation of their body according to CM.

Contained within each soundscape is the transmission of three time-space processes of relational listening. The first time-space of listening is activated by the process of using CM pulse diagnosis as a tool to listen to the embodied emergences of others as an *organic* practice of relational listening. This initial organic time-space of listening to another subsequently becomes folded within a secondary time-space of listening – the time-space of meditating upon and translating participants' bodies into sonic objects. This occurs by reflecting upon each encounter and studying the mappings of participants' bodies on each notation and then transforming this 'meditative listening' into material audio processes (via programming). The third space of relational listening is produced by live digital playback of pulse soundscapes to public audiences, either in the form of a headphone piece, or as an immersive sound installation. Thus, these listenings – the organic, the meditative and the digital – are all folded together into the production and transmission of bespoke aural architectures that create unique experiences for listening relationally.⁴²⁴

⁴²⁴ As mentioned in Chapter Five, this form of relational listening has a cycle that travels from the artist-researcher (who listens to participants), to the participant (who listens to my composition of their body according to CM), to the listening space of interpreting participants' feedback on their experiences of listening to their soundscapes... and finally a collective form of listening via live

Pulse Project soundscapes subsequently offer a new methodological approach to sound studies through creating soundscapes that participate from within what artist-psychologist-theorist Bracha Ettinger describes as the 'matrixial gaze/space' - a space of embodied 'co-emergence' and co-poesis (see Ettinger, 2006, p.65). The materiality of these soundscapes draws upon the moment of intimate connection between others and myself - and also between the soundscapes (as an affective sonic body) and audiences immersed within the sonic bodies of others. In this way, the soundscapes look within, in-between and towards communicating our more complex experience of embodying being-in-time.

Limitations

This project's transdisciplinary design adopts a heterogeneous approach both to research investigation and analysis processes by using artistic research as a 'home discipline' (see Leavy, 2012, p.34) from which to conduct a practice-centred investigation of medicine and technology from an intercultural perspective. Moreover, because disciplinary research is not conducted through (cognitive) hypothesis-led investigation, but an embodied artistic practice-led approach, this project is limited to exploring discourses that are directly relevant to the aims, objectives and questions generated by the *process* of my practice-based research.

Given this complex approach to research, *Pulse Project's* transdisciplinary investigations and discussions across art, medicine, technology and culture have accordingly touched upon a wide variety of disciplinary discourses. However, this project, does not offer a comprehensive discussion of specific artistic,⁴²⁵ medical,⁴²⁶ technological⁴²⁷ and intercultural⁴²⁸ discourses in and of themselves. This project's research focus is instead limited to elaborating on inter-relationships *between* discourses and practices that are relevant to both the lifeworld problem of this research (the hegemony of the clinic) and the practice-based cycles of investigation and analysis that this project generates.

Lastly, although this project explores medical diagnosis, auscultation and treatment processes, this research does not produce – nor claims to produce – functional medical

playback to wider audiences (as with my work with 4D).

⁴²⁵ 'Artistic' includes mainstream contemporary art, sound art and performance art fields.

⁴²⁶ 'Medical' refers to biomedicine and Chinese medicine practices only.

⁴²⁷ 'Technological' refers to digital technology, e.g., hardware and software systems, biomedical instrumentation, the 'essence' of technology in the Heideggerian sense and human somatosensory intelligence (used as a technology).

⁴²⁸ 'Intercultural' refers to the relationship between Chinese and Euro-American cultures.

diagnoses or treatments. This is made clear in the Participant Information Sheets.⁴²⁹ This project instead produces artistic analyses of these medical practices. Moreover, this research also does not comprehensively explore the meaning and purpose of medical diagnosis and treatments as epistemological subjects to produce fact-centred medical knowledge, but ethically and artistically researches medical investigation processes to produce new cross-disciplinary connections and significances.

Further Research

As a project that explores intercultural and transdisciplinary practices of art, medicine and technology – since this research has only been conducted in Europe – in order to strengthen the intercultural relevance of this project, further research of Chinese culture and Chinese artists is needed.⁴³⁰ This was confirmed when I presented my research at ‘Consciousness Reframed 2015’ in Shanghai, where I received some initial positive comments from Chinese artist-researchers on the way I bring traditional Chinese concepts together with contemporary Western artistic concepts and methods. They also mentioned that greater research of East-West relationships in China would be an ideal area for further development of this project.

Given this experience, I feel it is particularly important for me to identify and collaborate with Chinese artists who use CM as a medium for producing aesthetic knowledge.⁴³¹ Collaborative research with Chinese artist-researchers on this topic would greatly inform, challenge and extend the aims and questions already initiated by this project. Likewise, working with CM physicians on artistic research projects in China constitutes an interesting and significant area of future development. Therefore, working with these particular communities in China would allow me to test out some of my reflections on intercultural and nonmodern embodiment; and at the same time, it would strengthen my knowledge of CM practice, Chinese language and culture, and enable me to produce research that is more culturally complex and integrated.

As also mentioned in Chapter Five, using CM as an artistic medium is an emerging trend, and as such, it presents rich potential for further research both for myself and for other researchers. CM provides an important research resource for transcultural practice as it has travelled from the Pacific basin of ancient China (from at least 300 BCE) to become practiced in over 160 countries currently (see Graham, 2012, n.p.).

⁴²⁹ See Appendix VI.

⁴³⁰ This was also mentioned at the close of Chapter Five.

⁴³¹ As also mentioned in the section entitled ‘Chinese Medicine as Art’ in Chapter Five.

Consequently, the duration and global expansion of CM practice undermines notions of contemporaneity and the (false) divisions between modernity/premodernity and East/West. It also offers an intensive integration of artistic and scientific practice and challenges (modern) dualist approaches to the human body. For these reasons, research of CM in transdisciplinary, transcultural and nonmodern contexts yields great potential for other researchers to develop further. Additionally, I aim to conduct a feminist analysis of CM practice, paying particular attention to feminist readings of Confucian interpretations of medical texts in order to consider what these interpretations might yield, both within the field of CM and AST. This would only be undertaken in collaboration with interested qualified Chinese researchers.

Finally, I also briefly mention here my future collaboration between Paul Ooman and the 4DSOUND team because we will be using this research to further explore the relationship between the body's infrasonic dynamics (according to CM theory) and designing external bodies of dynamic sound that synchronize and harmonize with the body. This collaboration will therefore be testing Lefebvre's notion of intervening with rhythm (see Lefebvre, 2004, p.68) as a method for enhancing the health and wellbeing of the body.

Conclusion: *Pulse Project* and *Rhythmanalysis*⁴³²

'Everywhere where there is interaction between a place, a time and an expenditure of energy, there is rhythm' (Lefebvre, 2004, p.15).

As discussed in chapters four and five,⁴³³ Lefebvre's *Rhythmanalysis* (2004) aligns with the direction this project takes in syncretically layering poetic and diagnostic analysis together as a means for contributing to and extending transdisciplinary practice of art, science and technology. As Lefebvre remarks:

'The rhythmanalyst will not be obliged to jump from the inside to the outside of observed bodies; he should come to listen to them as a whole and unify them by taking his own rhythms as a reference: by integrating the outside with the inside and vice versa'... The body produces a garland of rhythms, one could say a bouquet, though these words suggest an aesthetic arrangement, as if the artist's nature had foreseen beauty – the harmony of the body (of bodies).' (Lefebvre, 2004, p.20)

Similar to Lefebvre's description of the work of the rhythmanalyst, *Pulse Project* integrates together embodied, intuitive and empirical aspects of analysis in order to present new understanding of the relational human body through sonic practice. This is accomplished

⁴³² This section is a rewritten version of an excerpt from one of my previously published articles. See Appendix II, pages 239-240.

⁴³³ See pages 104-106, 132.

through translating the interior rhythms of the body into unique arrays of rhythmic sound that resound around, away from, and throughout the body – as *Pulse Project* soundscapes resonantly interconnect the rhythmic infrasonic patterns of the inner body with the life-rhythms and sounds of exterior environments.

As an artist-acupuncturist who uses pulse analysis to interpret the emergences of the biological and technical together with the concrete and poetic, I extend Lefebvre's speculations on rhythmicity and analytic operation as he defines it below:

'Often coupled empirically with speculations (see, for example, doctors in the field of auscultation, etc.), the analytic operation simultaneously discovers the multiplicity of rhythms and the uniqueness of particular rhythms (the heart, the kidneys, etc.). The rhythmanalysis here defined as a method and a theory pursues this time-honoured labour in a systematic and theoretical manner, by bringing together very diverse practices... medicine, history, climatology, cosmology, poetry (the poetic)... [thus] he pursues an interdisciplinary approach.' (Lefebvre, 2004, p.16-22)

Likewise, Henriques, Tiainen and Valaiho (2014, p.4) also define rhythm as 'a concept that moves between disciplines, [by] focusing attention on... how our sensory worlds are mediated and organized.' Accordingly, *Pulse Project* responds to these discussions on rhythm as transdisciplinary and embodied by using the body as an instrument to conduct an artistic and scientific analysis of the cosmological rhythms of space, time and matter in order to produce unique knowledge of being-in-time.⁴³⁴ It does so by utilising Chinese medicine's (CM) metaphysical⁴³⁵ and 'onto-epistemological'⁴³⁶ approach to measuring and understanding the body's communication with the wider cosmic alchemical rhythms of the two primal forces (*yīnyáng*) and the five phases (*wǔxíng*).

In CM, the human pulse materialises the rhythmic condition of the entire body (*zàng-fǔ jīng-luò*) as it resonates in accordance or dissonance with the wider polyrhythms of social, technical and natural lifeworld processes.⁴³⁷ Therefore, in *Pulse Project* I practice and produce 'rhythmanalysis' as a holistic approach to knowledge production by using CM pulse analysis to interpret and sonify (and thereby communicate) the unique frequencies and cadences of participants' Heart, Kidneys, Gall Bladder and so on... thus giving

⁴³⁴ See '*Pulse Project* as Rhythmanalysis' in Chapter Four and 'Sound and the Affective Social Economy' in Chapter Five for further elaboration on Lefebvre's conceptions of rhythmanalysis.

⁴³⁵ The 'metaphysical' approach of CM as I refer to it here is discussed in the sections titled: 'The Body Ecologic' and 'Zhèng as Matrixial Interface' in Chapter Three. See also Scheid, 2014, p.107, Kipnis, 2012, p.217 and Wang and Xu, 2014, S-13.

⁴³⁶ This refers to Barad's 'onto-epistemology' concept as 'the intertwined practices of knowing and being' (Barad, 2007, p.406) because CM pulse analysis – particularly the use of touch as a medical instrument – likewise demonstrates the inseparability between, subject, object and sensory perception within knowledge production.

⁴³⁷ See the section titled 'Zhèng as Matrixial Interface' in Chapter Three for further discussion on how the diagnostic rubric of *zhèng* (in CM pulse analysis) makes it possible to read the materialisations of the body-environment-cosmos interface through understanding the unique dynamics of a person's pulse wave-image patterns.

bespoke dynamic form to each participant's relational being-in-time. In using my body as an instrument to measure and understand the significances of the unique rhythms of individual bodies in relation to the rhythms of the lifeworld, *Pulse Project's* analytical operations not only create new resonant knowledge of the body, but by harmonically synchronising the rhythmic intercommunication between body, time and place, they also produce eurythmic equilibrium of the body-lifeworld continuum to enhance being-well in the world.⁴³⁸

Thus *Pulse Project* performs, composes, and produces transdisciplinary research as a *new* rhythmanalysis practice... as an act of participation in and contribution to a larger always-emerging composition of ecological being and discourse – a knowledge activity that maintains an intimate connection with the gestalt unfolding of the world.

⁴³⁸ See discussion of rhythm and bodily health in the section '*Pulse Project* as Rhythmanalysis' in Chapter Four.

References

- Ableton, 2016. *Live: Made for Performing Music*. [online] Available at: <<https://www.ableton.com/en/live/feature-comparison/>> [Accessed 1 February 2016].
- Adams, J. 2013. *Primary Health Care and Complementary and Integrative Medicine: Practice and Research*. Singapore: World Scientific.
- Akoberg, A.K., 2005. Understanding randomised control trials. *Archives of Disease in Childhood*, 90, pp.840-844.
- Almog, J., 2005. *What am I?: Descartes and the Mind-body Problem*. Oxford: Oxford University Press.
- Amacher, M., 1999a. *Sound Characters (Making the Third Ear)*. [CD] New York: Tzadik.
- Amacher, M., 1999b. *Liner Notes to: Sound Characters (Making the Third Ear)*. [manuscript] New York: Tzadik - TZ 7043.
- Anderson, L., 1979. *The Handphone Table: Remembering Sound*. [online] Available at: <http://kunstradio.at/REPLAY/INSTALLATIONS/WORKS/anderson_handphone.html> [Accessed 10 May 2016].
- Aristotle, 350 BCE. Book 1. In: Aristotle, *Metaphysics*. Translated from Greek by W.D. Ross. [online] Cambridge, MA: MIT – The Internet Classics Archive. Available at: <<http://classics.mit.edu/Aristotle/metaphysics.1.i.html>> [Accessed 25 July 2016].
- Artaud, A., 1958 [1938], *The Theatre and its Double*. Translated from French by M.C. Richards. New York: Grove Press.
- Arts Catalyst, 1996. *The Body Visual*. [online] Available at: <<http://www.artscatalyst.org/artist/helen-chadwick>> [Accessed 03 February 2016].
- Arts Catalyst, 2016. *Arts Catalyst Centre for Art, Science and Technology Launch Date Announced*. [online] Available at: <<http://www.artscatalyst.org/news/arts-catalyst-centre-art-science-technology-launch-date-announced>> [Accessed 1 February 2016].
- Ascott, n.d. *Planetary Collegium*. [online] Available at: <<https://about.me/planetary.collegium>> [Accessed 3 January 2016].
- Ascott, R., 2000. Introduction. In: R. Ascott, ed. *Reframing Consciousness: Art, Mind and Technology*. Exeter: Intellect Books. pp.1-5.
- Ascott, R., 2005. Syncretic Reality and the Technoetic Universe. *4th. International Conference on Entertainment Computing*. September 19-21. Sanda, Japan: Kwansei Gakuin University.
- Austin, W., Park, C. and Goble, E., 2008. From Interdisciplinary to Transdisciplinary Research: A Case Study. *Qualitative Health Research*, 18(4), pp. 557-564.
- BAAB, n.d. *The Board's Accredited Courses*. [online] London: British Acupuncture Accreditation Board. Available at: <<http://www.baab.co.uk/accredited-courses.html>> [Accessed 10 March 2016].
- BAC, 2016. *Is acupuncture available for free on the NHS?* [online] London: British Acupuncture Council. Available at: <<http://www.acupuncture.org.uk/public-content/public-ask-an-expert/ask-an-expert-about-acupuncture/ask-an-expert-about-acupuncture-nhs-private-healthcare/is-acupuncture-available-free-on-the-nhs-and-where-do-practitioners-practice.html>> [Accessed 20 March 2016].

- Bachelard, G., 1950. *La Dialectique de la Durée*. Paris: Les Presses Universitaires de France.
- Bal, M., 2002. *Travelling Concepts within the Humanities*. Toronto: University of Toronto Press.
- Barad, K., 2003. Posthumanist Performativity: Towards an Understanding of How Matter Comes to Matter. *Signs*, 28(3), pp.801-831.
- Barad, K., 2007. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham, NC: Duke University Press.
- Barlow, T.E. ed., 1997. *Formations of Colonial Modernity in East Asia*. Durham, NC: Duke University Press.
- Barrett, E., 2014. Introduction: Extending the Field: Invention, Application and Innovation in Creative Arts Enquiry. In: E. Barrett and B. Bolt, eds., *Material Inventions: Applying Creative Research*. London: I.B. Tauris & Co, Ltd. pp. 1-20.
- Barrett, E. and Bolt, B., 2007. *Practice as Research: Approaches to Creative Arts Inquiry*. London: I.B. Tauris & Co, Ltd.
- Bassett, C., 2015. Not Now? Feminism, Technology, Postdigital. In: D.M. Berry and M. Dieter, eds., *Postdigital Aesthetics: Art, Computation and Design*. Basingstoke: Palgrave Macmillan. pp.136-150.
- Beringer, P., 2001. Introduction: the 'science wars.' In: K. Ashman and P. Beringer, eds., *After the Science Wars: Science and the Study of Science*. London: Routledge. Ch.1.
- Berman, Marshall. 2010. *All That Is Solid Melts Into Air: The Experience of Modernity*. London and Brooklyn: Verso.
- Bertelsen, L. and Murphie, A., 2010. An Ethics of Everyday Infinities and Powers: Félix Guattari on Affect and the Refrain. In: M. Gregg and G. Seigworth, eds., *The Affect Theory Reader*. Durham, NC: Duke University Press. pp.138-157.
- Bialock, D., 2007. *Eccentric Spaces, Hidden Histories*. Stanford, CA: Stanford University Press.
- Bishop, C., 2004. Antagonism and Relational Aesthetics. *October*, 110, pp. 51-79.
- Bishop, C., 2012. *Artificial Hells: Participatory Art and the Politics of Spectatorship*. London: Verso.
- Bleeker, M., ed., 2008. *Anatomy Live: Performance and the Operating Theatre*. Amsterdam: Amsterdam University Press.
- Borgdorff, H., 2012. *The Conflict of the Faculties: Perspectives on Artistic Research and Academia*. Leiden: Leiden University Press.
- Bourdieu, P. and Passeron, J.C., 1977. *Reproduction in Education, Society and Culture*. Translated from French by R. Nice. Newbury Park, CA: SAGE Publications Ltd.
- Bourriaud, N., 1998. *Relational Aesthetics*. Dijon: Les Presses Du Réel.
- Braidotti, R., 2013. *The Posthuman*. Oxford: Polity.
- Broderick, S., 2011. Arts practices in unreasonable doubt? Reflections and understandings of arts practices in healthcare contexts. *Arts & Health*, 3(2) [online] Available at< <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3362801/>> [Accessed 10 March 2013].
- Bryan, C.J., Marrow, C. and Appolonio, K.K., 2009. Impact of behavioural health consultant interventions on patient symptoms and functioning in an integrated family medicine clinic. *Clinical Psychology*, 65 (3), pp. 281-291.

- Buck, L., 1996. Unnatural Selection. In: H. Chadwick, L. Galli and D. Rodney, 1996., *Body Visual*. London: Arts Catalyst, pp. 21-40.
- Bunker, J.P., 2001. The role of medical care in the contributing to health improvements in society. *International Journal of Epidemiology*, 30(6), pp. 1260-1263.
- Caballero, R., 2014. *The Resounding Body: Epistemologies of Sound, Healing and Complementary and Alternative Medicine on Canada's West Coast*. Ph.D. University of British Columbia, Vancouver.
- Cage, J., 1961. *Silence*. Middletown, CA: Wesleyan University Press.
- Candy, L., 2006. *Practice-Based Research: A Guide*. Sydney: University of Technology - Creativity and Cognition Studios.
- Cant, S. and Sharma, U., 2004. *A New Medical Pluralism: Complementary Medicine, Doctors, Patients and the State*. London: Routledge.
- Carman, T., 1999. The Body in Husserl and Merleau-Ponty, *Philosophy Topics*, 27(2), pp.205-226.
- CCS, n.d. *Differences between practice-based and practice-led research*. [online] Available at: <<http://www.creativityandcognition.com/research/practice-based-research/differences-between-practice-based-and-practice-led-research/>> [Accessed 15 March 2016].
- Chadwick, H., 1987-1996. *Notebook 1987-1996*. [online] Leeds: Henry Moore Institute. Available at: <<http://hmi.onlineculture.co.uk/tfp/tfp.html>> [Accessed 03 February 2016].
- Chen, C.Y., 1996. *Early Chinese Work in Natural Science: A Re-examination of the Physics of Motion, Acoustics, Astronomy and Scientific Thoughts*. Hong Kong: Hong Kong University Press.
- Chen, Z.P., 2008. Chinese Music's Five Elements, Five Tones. *The Epoch Times*. [online] 2 October. Available at: <<http://www.theepochtimes.com/n2/china-news/chinese-music-five-elements-5137.html>> [Accessed 15 June 2014].
- Chimisso, C., 2013. *Critique of Science and the Imagination*. London: Routledge.
- Choi, Y.J., 2010. *East and West, Understanding the Rise of China*. Bloomington, IN: iUniverse.
- Chrisafis, A., 2016. Nuit-Debout Protestors Occupy French Cities in a call for Revolutionary Change. *The Guardian*. [online] 8 April. Available at: <<http://www.theguardian.com/world/2016/apr/08/nuit-debout-protesters-occupy-french-cities-in-a-revolutionary-call-for-change>> [Accessed 9 April 2016].
- Clift, S., 2012. Creative arts as a public health resource: moving from practice-based research to evidence-based practice, *Perspective in Public Health*, 132(3), pp.120-127.
- Collins, H., 2010. *Tacit and Explicit Knowledge*. Chicago, IL: University of Chicago Press.
- Collins, P.H., 1986. Learning from the outsider within: the social significance of black feminist thought. *Social Problems*, 33(6), S14-S32.
- Conquergood, D., 1991. Rethinking ethnography: towards a critical cultural politics. *Communication Monographs*, 56, pp. 179-94.
- Craven, C. and Davis, D.A., 2013. *Feminist Activist Ethnography: Counterpoints to Neoliberalism in North America*. New York: Lexington Books.
- Cronin, K., 2008. *Transdisciplinary Research (TDR) and Sustainability*. Wellington, NZ: Ministry of Research, Science and Technology.

- Csordas, T., 1990. Embodiment as a Paradigm for Anthropology. *ETHOS*, 18(1), pp. 5-47.
- Csordas, T., 1993. Somatic Modes of Attention. *Cultural Anthropology*, 8(2), pp.135-156.
- Daston, L. and Galison, P. 2007. *Objectivity*. Cambridge, MA: The MIT Press.
- Daston, L. and Galison, P., 1992. The Image of Objectivity, *Representations*, 0(40), pp. 81-128.
- Davidoff, F., Haynes, B., Sackett, D. and Smith, R., 1995. Evidence Based Medicine: a new journal to help doctors identify the information they need. *BMJ*, 310(6987), pp.1085–1086.
- Davies, M. and Kermani, F., 2012. *Patient Compliance: Sweetening the Pill*. Aldershot: Gower Publishing Ltd.
- Davis, N., 2016. Acupuncture for low back pain no longer recommended for NHS patients. *The Guardian*, 24 March, [online] Available at: <<https://www.theguardian.com/science/2016/mar/24/acupuncture-for-low-back-pain-no-longer-recommended-for-nhs-patients>> [Accessed 16 April 2016].
- Deleuze, G., 1992. *Expressionism in Philosophy: Spinoza*. Translated from French by M. Joughin. Cambridge, MA: Zone Books.
- Deleuze, G. and Guattari, F., 1987. *A Thousand Plateaus: Capitalism and Schizophrenia*. Translated from French by B. Massumi. Minnesota, MN: University of Minnesota Press.
- Descartes, R., 1988 [circa 1648]. *Descartes, Selected Philosophical Writings*. Translated from French by J. Cottingham and R. Stoothoff. Cambridge: Cambridge University Press.
- Di Liscia, O. P., n.d. *Pure Data*. [online] Available at: <<http://puredata.info/>> [Accessed 11 April 2013].
- Dissanayake, W., 1993. Body in Social Theory. In: T.P. Kasulis, R.T. Ames and W. Dissanayake, eds., *Self as Body in Asian Theory and Practice*. Albany, NY: SUNY Press. pp.21-36.
- Donnarumma, M., 2011. *Marco Donnarumma: Xth Sense*. [video online] Available at: <<http://marcodonnarumma.com/works/xth-sense/>> [Accessed 10 May 2016].
- Donnarumma, M., 2012. Incarnated Sound in Music for Flesh II. Defining gesture in biologically informed musical performance. *Leonardo Electronic Almanac*, 18(3), pp.164-175.
- Donnarumma, M., 2011-2012. *Music for Flesh II*. [video online] Available at: <<http://marcodonnarumma.com/works/music-for-flesh-ii/>> [Accessed 7 May 2016].
- Donnarumma, M., 2015. *0:Infinity*. [online] Available at: <<http://marcodonnarumma.com/works/0-infinity/>> [Accessed 8 May 2016].
- Edwards, M., 2011. Algorithmic Composition: Computational Thinking as Music. *Communications of the ACM*, 54(7), pp.58-67.
- EHC, 2016. *Environmental Health Clinic and Lab*. [online] Available at: <<http://www.environmentalhealthclinic.net/>> [Accessed 20 May 2016].
- Eliopoulos, E., 2010. *Invitation to Holistic Health: A Guide to Living a Balanced Life*. 2nd ed. Sudbury, MA: Jones and Bartlett Publishers.
- Ellis, A., Wiseman, N. and Boss, K., 1989. *Grasping the Wind: An exploration into the meaning of Chinese acupuncture point names*. Brookline, MA: Paradigm Publications.
- English, L., 2015. Relational Listening: The Politics of Perception. *Ear/Wave/Event*, [e-article].

- Available at: <<http://earwaveevent.org/article/relational-listening-the-politics-of-perception/>> [Accessed 13 May 2015].
- Eisenberg, W. and Wright, T.L., 1995. *Encounters with Qi: Exploring Chinese Medicine*. New York: W.W. Norton and Company.
- Elo, M. and Luoto, M. eds., 2014. *Senses of Embodiment: Art, Technics and Media*. Bern: Peter Lang AG, Internationaler Verlag der Wissenschaften.
- Ettinger, B.L., 2006. *The Matrixial Borderspace*. Minnesota, MN: Minnesota University Press.
- 4DSOUND, n.d(a). *4DSOUND; A New Dimension in Sound*. [online] Available at: <<http://www.4dsound.net/about/#about-overview>> [Accessed 5 May 2016].
- 4DSOUND, n.d(b). *4D,Animator*. [online] Available at: <<http://www.4dsound.net/system-details/2016/3/11/21sx9y63g2j2hnkt5vcjnaizbvhs0>> [Accessed 3 May 2016].
- 4DSOUND, n.d(c). *Custom Controllers*. [online] Available at: <<http://www.4dsound.net/system-details/2016/3/11/5prdfjawk8tlohs3h9acs0nf07dlz3>> [Accessed 6 May 2016].
- 4DSOUND, 2015a. *Circadian at TodaysArt*. [online] Available at: <<http://www.4dsound.net/project/circadian-todaysart>> [Accessed 5 May 2016].
- 4DSOUND, 2015b. *Circadian Full Line Up*. [blog] 1 September. Available at: <<http://www.4dsound.net/blog/circadian-full-lineup>> [Accessed 5 May 2016].
- 4DSOUND, 2015c. *Announcing Circadian Programme*. [online] Available at: <<http://www.4dsound.net/blog/announcing-circadian-programme>> [Accessed 7 May 2016].
- Farquhar, J. 1994. *Knowing Practice: The Clinical Encounter in Chinese Medicine*. Boulder, CO: Westview.
- Farquhar, J. and Zhang, Q., 2012. *Ten Thousand Things: Nurturing Life in Contemporary Beijing*. Cambridge, MA: MIT Press.
- Farquhar, J., 2014. Reading Hands: Pulse Qualities and the Specificity of the Clinical. *East Asian Science, Technology and Society*, 8(1), pp.9-23.
- Faurschou Foundation, 2016. *Work Descriptions: About Crystal Landscapes by Chen Zhen*. [online] Available at: <<http://www.faurschou.com/work-descriptions-chen-zhen-exhibition/about-artwork-crystal-landscape-of-inner-body-by-chen-zhen>> [Accessed 22 March 2016].
- FDL, 2000. *Atau Tanaka*. [online] Available at: <<http://www.fondation-langlois.org/html/e/page.php?NumPage=285>> [Accessed 10 May 2016].
- Federici, S., 2011. Feminism and the Politics of the Commons. [pdf] *The Commoner*. Available at: <<http://www.commoner.org.uk/wp-content/uploads/2011/01/federici-feminism-and-the-politics-of-commons.pdf>> [Accessed 28 June 2016].
- Ferraria, A., 2010. 'Our Cells / Ourselves: Sexual Politics in Bioart' In: A. Smelik, ed., *The Scientific Imaginary in Visual Culture*. Göttingen: Vandenhoeck & Ruprecht. pp. 149-161.
- Flaws, B., 1995. *The Secret of Chinese Pulse Diagnosis*. Boulder, CO: Blue Poppy Press.
- Flinterman, J., Teclemariam-Mesbah, R., Broerse, J.E. and Bunders, J.F., 2001. Transdisciplinarity: The New Challenge for Biomedical Research. *Bulletin of Science, Technology and Society*, 21(4), pp.253-266.
- Fook, J. and Gardner, F., 2007. *Practicing Critical Reflection: A Resource Handbook*. Maidenhead: McGraw-Hill Open University Press.
- Foster, H., 2006. Chat Rooms. In: Bishop, C. ed. 2006. *Participation*. London: Whitechapel

Ventures Limited. pp.190-196.

Foucault, M., 1973. *The Birth of the Clinic: An archaeology of medical perception*. Translated from French by A. M. Sheridan. London: Tavistock Publications.

Foucault, M., 1995[1977]. *Discipline and Punish: The Birth of the Prison*. Translated from French by A. Sheridan. New York: Vintage Books

Fox-Keller, 1995. *Reflections on Gender and Science*. New Haven, CT: Yale University Press.

Fraser, A., 2005. From the Critique of Institutions to an Institution of Critique. *Artforum*, 44(1), pp.278-285.

Furth, C., 1999. *A Flourishing Yin: Gender in China's Medical History, 960-1665*. Berkeley, CA: University of California Press.

Gao, Y., Pan, H., Shi, S. and Wu, S., 2006. The Five Organs Harmonise Pitch: Modern research and clinical treatment of the lost theory and technology in 'Huang Di Nei Jing.' *Asia Pacific Biotech News*, 10(14), pp.764-765.

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P. and Trow, M., 1994. *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*. London: SAGE Publications.

Gibson, J.J., 1977. Theory of Affordances. In: R. Shaw and J. Bransford, eds., *Perceiving, Acting, and Knowing: Toward an Ecological Psychology*. Hillsdale, NJ: Lawrence Erlbaum. pp. 67-82.

Giddens, A., 1998. *Conversations with Anthony Giddens: Making Sense of Modernity*. Stanford, CA: Stanford University Press.

Gill, R., 1988. Writing Reflexively and the Crisis of Representation. In: K. Henwood, C. Griffin and A. Phoenix, eds., *Standpoints and Differences: Essays in the Practice of Feminist Psychology*. London: SAGE Publications. pp.18-44.

Gillet, G., 2004. *Bioethics in the Clinic: Hippocratic Reflections*. Baltimore, MD: John Hopkins University Press.

Giri, A.K., 2002. The Calling of a Creative Transdisciplinarity, *Futures*, 34, pp. 103-115.

Glazebrook, T., 2012. *Heidegger on Science*. New York: SUNY Press.

GMC, n.d. *Confidentiality Guidance: Endnotes*. [online] Available at< http://www.gmc-uk.org/guidance/ethical_guidance/confidentiality_endnotes.asp> [Accessed 30 May 2016].

Gombrich, E., 1960. *Art and Illusion: A Study in the Psychology of Pictorial Representation*. London: Phaidon.

Goodman, S., 2012. *Sonic Warfare: Sound, Affect and the Ecology of Fear*. Cambridge, MA: The MIT Press.

Graham, D., 2012. Traditional Chinese Medicine - Establishing a Global Benchmark. *International Organisation for Standardization News (IOS)*. [online] 18 July. Available at: <http://www.iso.org/iso/home/news_index/news_archive/news.htm?refid=Ref1731> [Accessed 10 January 2016].

Greeno, J. G., 1993. Gibson's Affordances. *Psychological Review*, 101(2), pp.336-342.

Gregory, D., 2004. *The Colonial Present*. Malden, MA: Blackwell Publishing.

Groot Nibbelink, L. and Merx, S., 2010. Presence and Perception: Analysing Intermediality in Performance. In: S. Bay-Cheng, C. Kattenbelt, A. Lavender and R. Nelson, eds., *Mapping Intermediality in Performance*. Amsterdam: Amsterdam University Press. pp. 218-229.

Grosz, E., 1994. *Volatile Bodies: Towards a Corporeal Feminism*. New South Wales: Allen &

Unwin.

Grusin, R., 2015. *The Nonhuman Turn*. Minnesota, MN: University of Minnesota Press.

Guattari, F., 1984. *Molecular Revolution: Psychiatry and Politics*. London: Penguin Books.

Guattari, F., 1995. *Chaosmosis: an ethico-aesthetic paradigm*. Translated from French by P. Bains and J. Pefanis. Bloomington, IN: Indiana University Press.

Guattari, F., 1996a. Ritornellos and Existential Affects. In: G. Genosko, ed., *The Guattari Reader*. Oxford: Blackwell Publishers Ltd. pp. 158-171.

Guattari, F., 1996b. Toward a New Perspective on Identity. In: G. Genosko, ed., *The Guattari Reader*. Oxford: Blackwell Publishers Ltd. pp.215-17.

Guattari, F., 1996c. Remaking Social Practices. In: G. Genosko, ed., *The Guattari Reader*. Oxford: Blackwell Publishers Ltd. pp.262-272.

Guattari, F., 2000 [1989]. *The Three Ecologies*. Translated from French by I. Pindar and P. Sutton. New York: Athlone Press.

Hacking, I., 1996. The Disunities of Sciences. In: P. Galison and D.J. Stump, eds., *The Disunity of Science: Boundaries, Contexts and Power*. Stanford, CA: Stanford University Press. pp.37-74.

Haraway, D., 1988. Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective. *Feminist Studies*, 14 (3), pp. 575-599.

Haraway, D., 1991. *Simians, Cyborgs and Women: The Reinvention of Nature*. New York: Routledge.

Haraway, D., 2003. *The Companion Species Manifesto: Dogs, People and Significant Otherness*. Chicago, IL: Prickly Paradigm Press.

Harding, S., 1986. *The Science Question in Feminism*. Ithaca, NY: Cornell University Press.

Harding, S., 2004. Introduction. In: S. Harding, ed., *The Feminist Standpoint Theory Reader: Intellectual and Political Controversies*. London: Routledge. pp.1-16.

Harding, S. and Hintikka, M.C., 1983. Introduction. In: S. Harding and M.B. Hintikka, eds., *Discovering Reality: Feminist Perspectives on Epistemology, Metaphysics, Methodologies, and Philosophy of Science*. Dordrecht: D. Riedel. pp.ix-xix.

Hardt, M. and Negri, A., 2009. *Commonwealth*. Cambridge, MA: Belknap Press of Harvard University Press.

Harris, A., 2016. Listening-Touch, Affect, and the Crafting of Medical Bodies through Percussion. *Body & Society*, 22(1), pp.31-61.

Harris, J., 2015. Prescribing the arts for better health. *Arts Professional*. November [e-magazine]. Available at: <<http://www.artsprofessional.co.uk/magazine/article/prescribing-arts-better-health>> [Accessed 18 May 2016].

Harper, D.J., 1998. *Early Chinese medical Literature: The Mawangdui Medical Manuscripts*. London: Kegan Paul International.

Harstock, N.M.C., 1983. The Feminist Standpoint: Developing the Ground for a Specifically Feminist Historical Materialism. In: S. Harding and M.B. Hintikka, eds., *Discovering Reality: Feminist Perspectives on Epistemology, Metaphysics, Methodologies, and Philosophy of Science*. Dordrecht: D. Riedel. pp.283-310.

Hartmann, R., 2006. An attack on Chinese Medicine. *Asia Times*. [online newspaper] 20 October. Available at: <http://www.atimes.com/atimes/China_Business/HJ20Cb01.html> [Accessed 10 March 2016].

- Hayles, N.K., 1999. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. Chicago, IL: Chicago University Press.
- Heidegger, M., 1977 [1953]. The Question Concerning Technology. In D.F. Krell, ed., *Basic Writings*. Translated from German by W. Lovitt. New York: Harper & Row. pp. 292-317.
- Heidegger, M., 1962. *Being and Time*. 7th ed. Translated from German by J. Macquarrie and E. Robinson. New York: Harper & Row.
- Hekman, S., 1997. Truth and Method: Feminist Standpoint Theory Revisited. *Signs*, 22, pp.341-365.
- Henriques, J., Tiainen, M. and Valiaho, P., 2014. Rhythm Returns: Movement and Cultural Theory. *Body & Society*, 20(3-4), pp.3-29.
- Hepworth, D.H., Rooney, R.H., Rooney, G.D., Strom-Gottfried, K. and Larsen, J.A., 2009. *Direct Social Work Practice: Theory and Skills*. Andover, United Kingdom: Cengage Learning.
- Hirsch Hadorn, G., 2009. Preface. In: G. Hirsch Hadorn, ed., *Unity of Knowledge (in Transdisciplinary Research for Sustainable Development)*. Oxford: EOLSS Publishers/UNESCO. pp. ix-x.
- Hirsch Hadorn, G., Hoffman-Rienn, H., Biber-Klemm, S., Grossenbacher-Mansuy, W., Joye, D., Pohl, C., Wiesmann, U. and Zemp, E. eds., 2008. *Handbook of Transdisciplinary Research*. New York: Springer.
- Hirsch Hadorn G. and Pohl, C., 2008. Core Terms in Transdisciplinary Research. In: G. Hirsch Hadorn, H. Hoffman-Rienn, S. Biber-Klemm, W. Grossenbacher-Mansuy, D. Joye, C. Pohl, U. Wiesmann and E. Zemp, eds., *Handbook of Transdisciplinary Research*. New York: Springer. pp. 427-432.
- Hirsch Hadorn, G., Pohl, C. and Scheringer, M., 2009. Methodology of Transdisciplinary Research. In: G. Hirsch Hadorn, ed., *Unity of Knowledge (in Transdisciplinary Research for Sustainable Development)*. Oxford: EOLSS Publishers/UNESCO. pp. 1-29.
- Ho, K.T., 2013. Transfer and Translation: Negotiating Conflicting Worldviews. In: A.-CHR Engels-Schwarzpaul and M. Peters, eds., *Other Thoughts: Non-Traditional Ways to the Doctorate*. Rotterdam: Sense Publishers. pp. 82-100.
- Hood, B., 2013-ongoing. *Eidolon: An art project by Beverley Hood*. [blog] Available at: <<https://eidolonblog.wordpress.com>> [Accessed 19 May 2016].
- Hood, B., 2014b. *Eidolon Performance Workshop 9 June 2014*. [video online] Available at: <<https://youtu.be/j7Hu3oqg71c>> [Accessed 19 May 2016].
- Hougham, P., 2002. The Sculpting of Yi Shi: Alchemical Acupuncture and the Imagination of Dragons. *EJOM*, 4(1). pp. 24-38.
- Huang, P., 2009. *Confronting Confucian Understandings of the Christian Doctrine of Salvation*. Leiden: Brill.
- Huang, T., Zhang, W., Jia, S., Tian, Y., Wang, G., Yang, L., Gaischek, Wang, L. and Litscher, G., 2012. A Transcontinental Pilot Study for Acupuncture Lifting-Thrusting and Twisting-Rotating Manipulations, *Evidence-Based Complementary and Alternative Medicine* [online]. Available at: <<http://www.hindawi.com/journals/ecam/2012/157989/>> [Accessed 3 June 2016].
- Hsu, E., 1999. *The Transmission of Chinese Medicine*. Cambridge, UK: Cambridge University Press.
- Hsu, E., 2000. Towards a science of touch, part I: Chinese pulse diagnostics in early modern Europe. *Anthropology & Medicine*, 7(2), pp.251-268.

- Hsu, E., 2005. Tactility and the Body in Early Chinese Medicine. *Science in Context*, 18(1), pp.7-34.
- Hsu, E., 2007. The Biological in the Cultural: The Five Agents and the Body Ecological in Chinese Medicine. In: D. Parkin and S. Ulijaszek, eds., 2011. *Holistic Anthropology: Emergence and Convergence*. Oxford: Berghahn Books. Ch. 4.
- Hsu, E., 2008. The History of Traditional Chinese medicine in the People's Republic of China and its Globalization. *East Asian Science and Technology Studies*, 2(4), pp.465-485.
- Hsu, E., 2010. *Pulse Diagnosis in Early Chinese Medicine: The Telling Touch*. Cambridge: Cambridge University Press.
- Imrie, R. H., Ramey, D. W., Buell, P. D., Ernst, E. and Basser, S. P., 2001. Veterinary acupuncture and historical scholarship: claims for the antiquity of acupuncture. *The Scientific Review of Alternative Medicine*, 5, pp.133–139.
- Ingham, K., 2010. Art and the theatre of mind and body: how contemporary arts practice is re-framing the anatomo-clinical theatre, *Journal of Anatomy*, February, 216(2), pp. 251-263.
- Intellect, 2013. *Art as Research: Opportunities and Challenges*. [online] Bristol: Intellect. Available at: <<http://www.intellectbooks.co.uk/books/view-Book,id=5043/>> [Accessed 18 March 2016].
- Jackson, S., 2011. *Social Works: Performing Art, Supporting Publics*. London: Routledge.
- Jiang, M., Zhang, C., Zheng, G., Guo, H., Li, L., Yang, J., Lu, C., Jia, W. and Lu, A., 2012. Traditional Chinese Medicine Zheng in the Era of Evidence Based Medicine: A Literature Analysis. *Evidence-Based Complementary and Alternative Medicine*, Vol. 2012, [online] March. Available at: <<http://www.hindawi.com/journals/ecam/2012/409568/>> [Accessed 3 February 2015].
- Johnson, S.E., 2014. *Staging Women and the Soul-Body Dynamic in Early Modern England*. Farnham: Ashgate Publishing, Ltd.
- Jones, C.A. and Galison, P., 1998. Introduction. In: C.A. Jones and P. Galison, eds., *Picturing Science Producing Art*. London: Routledge. pp. 1-23.
- Kahn, D., 2008. *Active Hearing: Jacob Kirkegaard's Labyrinthitis*. [online] Available at: <<http://fonik.dk/works/labyrinthitis.html>> [Accessed 17 May 2016].
- Kamtekar, R., 2004. Situationism and Virtue Ethics on the Content of Our Character. *Ethics*, 114(3), pp. 458-491.
- Kane, B., 2013. Musicophobia, or Sound Art and the Demands of Art Theory. *nonsite.org*, [e-journal] 20 January 2013. Available at: <<http://nonsite.org/article/musicophobia-or-sound-art-and-the-demands-of-art-theory>> [Accessed 7 September 2013].
- Kant, E., 1885 [1791]. *Critique of Pure Reason*. Translated from Germ by J.M.D. Micklejohn. Cambridge, MA: Henry J. Bohn.
- Kaptchuk, T., 2002. The Placebo Effect in Alternative Medicine: Can the Performance of a Healing Ritual Have Clinical Significance? In: F.G. Miller, L. Colloca, R.A. Crouch and T. Kaptchuk, eds., 2013. *The Placebo: A Reader*. Baltimore, MD: John Hopkins University Press. pp.64-70.
- Kaptchuk, T., 2000. *The Web That Has No Weaver: Understanding Chinese Medicine*. New York: McGraw Hill Professional Publishing.
- Kattenbelt, C., 2008. Intermediality in Theatre and Performance: Definitions, Perceptions and Medial Relations, *Culture, Language and Representation*, 6, pp.19-29.

- Kay, S. and Rubin, M., 1996, *Framing Medieval Bodies*. Manchester: Manchester University Press.
- Kim, Y.C., Jeung, D.M. and Lee, M.S., 2004. An examination of the relationship between five oriental musical tones and corresponding internal organs and meridians. *Acupuncture and electrotherapeutics research*, 29(3-4), pp. 227-33.
- Kim-Cohen, S., 2009. *In the Blink of an Ear: Towards a Non-Cochlear Sonic Art*. New York: Continuum.
- Kipnis, A., 2012. *Chinese Modernity and the Individual Psyche*. Basingstoke: Palgrave Macmillan.
- Kirkegaard, J., 2007. *Labyrinthitis*. [online] Available at: <<http://fonik.dk/works/labyrinthitis.html>> [Accessed 15 May 2016].
- Klein, J.T., 2007. Interdisciplinary Approaches in Social Science Research. In: W. Outwaite and S.P. Turner, eds., *The Sage Handbook of Social Science Methodology*. London: SAGE Publications. pp. 32-49.
- Kleinmann, A., 2012. Intra-actions. *Mousse*, 34, pp.76-81.
- Knorr-Cetina, K., 2001. Objectual Practice. In: T.R. Schatzki, K. Knorr-Cetina and E. von Savigny, eds., *The Practice Turn in Contemporary Theory*. London: Routledge. pp.175-188.
- Ko, R., 2004. U.S. Perspectives on the Adverse Reactions from Traditional Chinese Medicines. *Journal of Chinese Medicine Association*, 67, pp. 109-116.
- Kortum, P., 2008. *HCI Beyond the GUI: Design for Haptic, Speech, Olfactory, and Other Nontraditional Interfaces*. Burlington, MA: Morgan Kaufmann.
- Koski, K., 2011. Dialogues between art, medicine and research. *Artistic Research in Action. Proceedings of CARPA2 – Colloquium on Artistic Research in Performing Arts*. Theatre Academy Helsinki, Finland. pp.119-126.
- Koski, K., 2016. *Kaisu Koski: Living Organism*. [online] Available at: <<http://www.kaisukoski.com/>> [Accessed 20 May 2016].
- Krieger, N. 2005. Embodiment: A conceptual glossary for epidemiology. *Journal of Epidemiology and Community Health*, 59, pp.350–355.
- Kwok, P.L., 2004. Spirituality of Healing. In: L.L. Barnes, ed., 2006. *Teaching Religion and Healing*. Oxford: Oxford University Press. pp.247-260.
- Larre, C. and Rochat de la Vallée, E., 1995. *Rooted in Spirit: The Heart of Chinese Medicine*. Translated from French by S. Strang. Barrytown, NY: Station Hill Press.
- Latour, B. and Woolgar, S., 1979. *Laboratory Life: The Social Construction of Scientific Facts*. Princeton, NJ: Princeton University Press.
- Latour, B., 1987. *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge MA: Harvard University Press.
- Latour, B., 1993. *We Have Never Been Modern*. Translated from French by C. Porter. Cambridge, MA: Harvard University Press.
- Latour, B., 1999. *Pandora's Hope: Essays on the Reality of Science Studies*. Cambridge, MA: Harvard University Press.
- Latour, B., 2004. Why Has Critique Run Out of Steam? From Matters of Fact to Matters of Concern. *Critical Inquiry*, 30(2), pp.225-248.
- Latour, B. 2005. *Reassembling the Social. An Introduction to Actor-Theory Network*. Oxford:

Oxford University Press.

LCCA, 2016. *Projects: The Contemporary Art Festival Survival Kit 8 Will Examine the Acupuncture of Society*. [online] Available at: <<http://www.lcca.lv/en/news/the-contemporary-art-festival-survival-kit-8-will-examine-the-acupuncture-of-society/>> [Accessed 25 May 2016].

Leavy, P., 2009. *Method Meets Art, First Edition: Arts-Based Research Practice*. New York: Guilford Press.

Leavy, P., 2012. *Essentials of Transdisciplinary Research: Using Problem Centered Methodologies*. Walnut Creek, CA: Left Coast Press.

Leavy, P., 2014. *Oxford Handbook of Qualitative Research*. Oxford: Oxford University Press.

Leavy, P., 2015. *Method Meets Art, Second Edition: Arts-Based Research Practice*. New York: Guilford Press.

Lee, J.H., 2015. *Jihyun Lee: Nue*. [online] Available at: <<http://jihyunlee.github.io/work/nue/>> [Accessed 6 May 2016].

Ledger, J., 2010. The gold-standard of management? Evidence-based management and healthcare delivery, *London Journal of Primary Care*, 3(2), pp.93-97.

Lefebvre, H., 2004. *Rhythmanalysis: Space, Time and Everyday Life*. Translated from French by S. Elden and G. Moore. London: Continuum.

Leonardo, n.d(a). Leonardo: The International Society for the Arts, Sciences and Technology. *Leonardo*. [online] Available at: <<http://www.leonardo.info/>> [Accessed 10 January 2016].

Leonardo, n.d(b). *Leonardo Art and Science Evening Rendezvous – LASER Talks*. [online] Available at: <<http://www.leonardo.info/isast/laser.html>> [Accessed 14 January 2016].

Leung, P.C., Xue, C. C. and Cheng, Y.C., 2003. *A Comprehensive Guide to Chinese Medicine*. London: World Scientific.

Lewis-King, M., 2005. *Interventions - Acupuncture as a Medical Art: An Exploration of Acupuncture, Art and Science*. BSc Dissertation. University of Westminster.

Lewis-King, M., 2011-2016a. *Michelle Lewis-King*. [blog] Available at: <www.codephd.wordpress.com> [Accessed 5 January 2016].

Lewis-King, M., 2011-2016b. *Pulse Project Playlists*. [sound archive online] Available at: <<https://soundcloud.com/cosmosonicsoma/sets>> [Accessed 5 January 2016].

Lewis-King, M., 2012. *Pulse Landscapes*. [online music label] Copenhagen: Clang. Available at: <<http://clang.cl/pulse-landscapes-2/>> [Accessed 5 January 2016].

Li, C. and Perkins, F., 2015. Introduction. In: C. Li and F. Perkins, eds., *Chinese Metaphysics and Its Problems*. Cambridge: Cambridge University Press. pp. 1-15.

Li, D.Y., 2004 [circa 1245]. *Li Dong-Yuan's Treatise of the Spleen and Stomach: A Translation of the Pi Wei Lun*. 2nd ed. Translated from Traditional Chinese by B. Flaws. Boulder, CO: The Blue Poppy Press.

Lo, V., 2000. The Influence of Western Han Nurturing Life Literature on the Development of Acumoxa Therapy. In: E. Hsu, ed., 2001. *Innovation in Chinese Medicine. Festschrift in Commemoration of Lu Gwei-djen*. Cambridge: Cambridge University Press. pp.19-51.

Longino, H., 1993. Subjects, Power and Knowledge: Description and Prescription in Philosophies of Science. In: L. Alcoff and E. Potter, eds., *Feminist Epistemologies*. London: Routledge. pp.49-82.

Lu, G.D. and Needham, J., 1980. *Celestial Lancets: A History and Rationale of Acupuncture and Moxa*. Cambridge: Cambridge University Press.

Lu, X., 2011. *Tang Poem. Chinese Medicine. Copying Time*. [online] Available at: <http://www.xiaoluart.com/xiaolu416/Style_Thirty_Two/en_album_658960_wtid_6738.shtml> [Accessed 23 May 2016].

Lucier, A., 1965. *Music for Solo Performer*. [online] Available at: <http://www.alvin-lucier-film.com/solo_performer.html> [Accessed 10 May 2016].

Luesink, D., 2015. State power, governmentality and the (mis)remembrance of Chinese medicine. In: H. Chiang, ed., *Historical epistemology and the making of modern Chinese medicine*. Oxford: Oxford University Press. pp. 160-187.

Lui, W.Q., Wang, Z., Yu, W.L., Chen, Y., Jiang, Y.T., Huang, J.P. and Jin, L., 2010. Study on the relationship between five Chinese tones sequence and human pulse wave. *China Journal of Traditional Chinese Medicine and Pharmacy*. 12, pp.2006-2009.

Lundgren, A., 2016. *Performing Resistance; Performing Therapy*. [online] Available at: <<http://performingresistance.org/>> [Accessed 20 May 2016].

Lykke, N., 2010. *Feminist Studies; A Guide to Intersectional Theory, Methodology and Writing*. London: Routledge.

Maciocia, G., 1993. The Psyche in Chinese Medicine. *European Journal of Chinese Medicine*, 1(1), [online] Available at: <<http://www.ejom.co.uk/vol-1-no-1/featured-article/the-psyche-in-chinese-medicine.html>> [Accessed 10 February 2016].

Maciocia, G., 2012. Shen and Hun: The Psyche in Chinese Medicine. *maciociaonline*, [blog]. November. Available at: <<http://maciociaonline.blogspot.co.uk/2012/11/shen-and-hun-psyche-in-chinese-medicine.html>> [Accessed 2 February 2015].

Maciocia, G., 2015. *Foundations of Chinese Medicine: A Comprehensive Text for Acupuncturists and Herbalists*. 3rd ed. London: Elsevier Health Sciences.

Macleod, K. and Holdridge, L. eds., 2005. *Thinking Through Art: Reflections on Art as Research*. London: Routledge.

Makris, G.C., Spanos, A., Rafailidis, P.I. and Falagas, M.E., 2009. Increasing contribution of China in modern biomedical research. Statistical data from ISI web of Knowledge. *Medical Science Monitor*, 15 (12), pp.SR15-SR21.

Malabou, C., 2005. *The Future of Hegel: Plasticity, Temporality and Dialectic*. London: Routledge.

Malina, R., 2015. Concerning Human Understanding Redux: Arguing against the term 'art-science.' *Malinadiatrope*, [blog]. 19 July. Available at: <<http://malina.diatrope.com/2015/07/19/concerning-human-understanding-redux-arguing-against-the-term-artscience/>> [Accessed 15 February 2016].

Malone, M., 2007. *Andrea Fraser: What Do I, as an Artist, Provide?* St. Louis, MO: Mildred Lane Kemper Art Museum.

Manning, E., 2009. *Relationscapes: Movement, Art, Philosophy*. Cambridge, Massachusetts: The MIT Press.

Mannion, G. and Gilbert, J., 2015. Place-responsive intergenerational education. In: R.M. Vanderbeck and N. Worth, eds., *Intergenerational Space*. London: Routledge. pp. 228-241.

Manzo, V.J., 2011. *Max/MSP/Jitter: A Practical Guide to Developing Interactive Music*. New York: Oxford University Press.

Margulies, J., 2014. *ABLETON LIVE 9 POWER: The Comprehensive Guide*. London: Cengage Learning.

- Marié, E., 2011. The Transmission and Practice of Chinese Medicine. *china perspectives*, 3, pp.5-13.
- Masini, E.B., 2000. Transdisciplinarity, Future Studies, and Empirical Research. In: M.A. Somerville and D.J. Rapport, eds., *Transdisciplinarity: ReCreating Integrated Knowledge*. Oxford: EOLSS Publisher Ltd. pp. 11-124.
- Massumi, B., 1995. The Autonomy of Affect. *Cultural Critique*, 31, Autumn Issue, pp. 83-109.
- Matsumoto, D., 1996. *Culture and Psychology*. Pacific Grove, CA: Brooks/Cole.
- Matuk, C., 2006. Seeing the Body: The Divergence of Western and Ancient Chinese Medical Illustration. *Journal of Biocommunication*, 32 (1), pp.1-8.
- Maynard, M., 1997. Revolutionizing the Subject: Women's Studies and the Sciences. In: M. Maynard, ed., *Science and the Construction of Women*. London: Routledge. pp. 1-14.
- McCartney, J., 2002. Rethinking computer music language: Supercollider. *Computer Music Journal*, 26(4), pp. 61-68.
- McDade-Montez, E., 2014. Biomedical Model. In: A.J. Christensen, R. Martin and J.M Smyth, eds., *Encyclopaedia of Health Psychology*. London: Kluwer Academic/ Plenum Publishers. p.28.
- McNiff, S., 2008. Arts-Based Research. In: J.C. Knowles and A.L. Cole, eds., *Handbook of Education and the Arts in Qualitative Research*. London: SAGE Publications. pp. 29-40.
- McNiff, S., 2013. *Art as Research: Opportunities and Challenges*. Bristol: Intellect.
- Merleau-Ponty, M., 1962 [1945]. *Phenomenology of Perception*. Translated from French by C. Smith. London: Routledge.
- Merleau-Ponty, M. 1968 [1964]. *The Visible and the Invisible*. Translated from French by A. Lingis. Evanston, IL: Northwestern University Press.
- Merriam-Webster, 2015. *Merriam-Webster English Dictionary and Thesaurus: An Encyclopaedia Britannica Company Online*. [online] London: Encyclopaedia Britannica (UK). Available at: <<http://www.merriam-webster.com/>> [Accessed 30 March 2015].
- Micozzi, M.S., 2014. *Fundamentals of Complementary and Alternative Medicine*. St. Louis, MO: Elsevier Health Sciences.
- Millburn, M. P., 2004. *Understanding the Convergence of Complementary, Alternative and Conventional Health Care*. [pdf] University of North Carolina Chapel Hill, School of Medicine. Available at: <<http://www.med.unc.edu/phyrehab/pim/files/Convergence.text.pdf>> [Accessed 30 March 2015].
- MIT, 2012. *MIT Establishes Center for Art, Science and Technology (CAST)*. [online] Available at: <<http://news.mit.edu/2012/center-for-art-science-technology-cast-established-0412>> [Accessed 1 February 2016].
- Moerman, D.E., 2002. *Meaning, medicine and the 'placebo effect.'* Cambridge: Cambridge University Press.
- Mol, A., 2003. *The Body Multiple: Ontology in Medical Practice*. Durham, NC: Duke University Press.
- MOMA, 2010. *MOMA Projects: The Handphone Table*. [online] Available at: <http://www.moma.org/momaorg/shared/pdfs/docs/press_archives/5652/releases/MOMA_1978_0088_81.pdf?2010> [Accessed 12 May 2016].
- Morton, T., 2016. *Dark Ecology: For a Logic of Future Coexistence*. New York: Columbia University Press.

- Nagel, T., 1986. *The View From Nowhere*. Oxford: Oxford University Press.
- Nancy, J.L., 2007. *Listening*. Translated from French by C. Mandell. New York: Fordham University Press.
- Nardini, C., 2014. The ethics of clinical trials, *ecancermedicalscience*, 8(387) [online] Available at: <<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3894239/>> [Accessed 30 May 2016].
- NCCIH, 2008. *Complementary, Alternative or Integrative: What's in a Name?* [online] Bethesda, MD: NCCIH. Available at: <<https://nccih.nih.gov/health/integrative-health#cvsa>> [Accessed 28 May 2016].
- Nelson, R., 2010. Prospective Mapping. In: S. Bay-Cheng, C. Kattenbelt, A. Lavender and R. Nelson, eds., 2010. *Mapping Intermediality in Performance*. Amsterdam: Amsterdam University Press. pp.13-23.
- Neurosky, 2016. *Neurosky: Mind and Body Quantified*. [online] Available at: <<http://neurosky.com/>> [Accessed 6 May 2016].
- NHS, n.d., *The placebo effect and complementary and alternative medicine* [online] Available at: <http://www.nhs.uk/Livewell/complementary-alternative-medicine/Pages/placebo-effect.aspx> [Accessed 27 May 2016].
- NICE, 2016. *Exercise not acupuncture for people with low back pain says NICE in draft guidance*. [online] Available at: <<https://www.nice.org.uk/news/press-and-media/exercise-not-acupuncture-for-people-with-low-back-pain-says-nice-in-draft-guidance>> [Accessed 12 April 2016].
- Nie, J.B., 2013. *Medical Ethics in China: A Transcultural Interpretation*. London: Routledge.
- OECD, WHO and Eurostat, 2011. *A System of Health Accounts 2011 Edition*. Paris: OECD Publishing.
- Olin, M., 1989. Forms of Respect: Alois Riegl's Concept of Attentiveness. *The Art Bulletin*, 121(2), pp.285-299.
- O'Riordan, K., 2012. *The Genome Incorporated: Constructing Biodigital Identity*. Farnham: Ashgate Publishing, Ltd.
- Orr, D. 2007. The mind/body paradigm crisis and a new paradigm for feminism. In: D. Orr, D. Taylor and L. Lopez McAlister, eds., *Feminist Politics: Identity, Difference and Agency*. Lanham, MD: Rowman and Littlefield Publishers. pp.15-39.
- Ortner, S.B., 1995. Resistance and the Problem of Ethnographic Refusal. *Comparative Studies in Society and History*, 37(1), pp. 173-193.
- Ouzounian, G., 2008. *Sound Art and Spatial Practices: Situating Sounds Installation Practices Since 1958*. Ann Arbor, MI: ProQuest Information and Learning Company.
- Oxford Dictionaries, 2016. *Oxford Dictionaries: Language Matters*. Oxford: Oxford University Press [online]. Available at: < <http://www.oxforddictionaries.com/definition>> [Accessed 16 July 2016].
- Park, L., 2013. *Eunoia*. [video online] Available at: <<http://www.thelisapark.com/#/eunoia/>> [Accessed 6 May 2016].
- Park, L., 2015. *Nue* [online] Available at: <<http://www.thelisapark.com/#/nue/>> [Accessed 6 May 2016].
- Parsons, J.A. and Boydell, K.M., 2012. Arts-based research and knowledge translation: some key concerns for healthcare professionals, *Journal of Interprofessional Care*, 26(3), pp.170-172.
- Paterson, C. and Dieppe, P., 2005. Characteristic and incidental (placebo) effects in complex

- interventions such as acupuncture. *BMJ*, 330(7501), pp. 1202-1205.
- Pepperrell, R., 2003. *The Posthuman Condition: Consciousness Beyond the Brain*. Bristol: Intellect Books.
- Pickering, A., 1993. The Mangle of Practice: Agency and Emergence in the Sociology of Science. *The American Journal of Sociology*, 99(3), pp. 559-589.
- Pinheiro dos Santos, L.A., 1931. *Ritmanálise*. Rio de Janeiro: Sociedade de Psicologia e Filosofia.
- Plsek, P.E. and Greenhalgh, S., 2001. The challenge of complexity in health care. *BMJ*, 323(7313), pp.625 - 628.
- Plymouth University, n.d. Planetary Collegium. *plymouth.ac.uk* [online]. Available at: <<http://www6.plymouth.ac.uk/researchcover/rcp.asp?pagetype=G&page=273>> [Accessed 02 February 2016].
- Pohl, C., and Hirsch Hadorn, G., 2007. *Principles for designing transdisciplinary research*. Translated from German by A.B. Zimmermann. Munich, Germany: Oekom Gesell F. Oekolog.
- Project Anywhere, 2015. *Pulse Project: A Sonic Investigation Across Bodies, Cultures and Technologies*. [online] Available at: <<http://www.projectanywhere.net/pulse-project-a-sonic-investigation-across-bodies-cultures-and-technologies-michelle-lewis-king/>> [Accessed 28 April 2016].
- Prophet, J., 2011. New Media, Art-Science and Contemporary Art: Towards a Hybrid Discourse? An Artist in the Laboratory: Co-Operating (T)reasonably. *artnodes*, 11, pp.97-101.
- Qu, L. and Garvey, M., 2006. Shen-Zhi Theory: Analysis of the Signs and Symptoms of mental Disorder. *European Journal of Chinese Medicine*, 5(2), [online] Available at: <<http://www.ejom.co.uk/vol-5-no-2/featured-article/shen-zhi-theory-analysis-of-the-signs-and-symptoms-of-mental-disorder.html>> [Accessed 15 February 2016].
- Reiser, S.J., 1981. *Medicine and the Reign of Technology*. Cambridge: Cambridge University Press.
- Riegl, A., 1902. Das Hollandische Gruppenportrit. In: K.M. Swoboda, ed., 1931. *Jahrbuch der Kunsthistorischen Sammlungen des Allerhchsten Kaiserhauses*. 2nd ed. Vienna: Halm and Goldmann.
- Rochat de la Vallée, E., 2009. *Wu Xing*. Taos, NM: Redwing Book Company.
- Rodgers, T., 2010. *Pink Noises: Women on Electronic Music and Sound*. Durham, NC: Duke University Press.
- Rodriguez, C., 2015. It's Symptomatic/What Would Edit Say? *Document Journal*. [online] 13 May. Available at: <<http://www.documentjournal.com/article/its-symptomatic...-by-carissa-rodriguez>> [Accessed 20 May 2016].
- Rose, H., 1983. Hand, Brain, Heart: Feminist Epistemology for the Natural Sciences. *Signs*, 9(1), pp. 73-90.
- Rose, K. and Zhang, Y.H., 2001. *A Brief History of Qi*. Brookline, MA: Paradigm Publications.
- Ross, S. (ed.), 2009. *Modernism and Theory: A Critical Debate* London: Routledge.
- Rossi, E., 2000. The Space Shared Between the Patient and the Acupuncturist. *EJOM*, 3(2), pp. 43-52.
- Rust, C., Mottram, J. and Till, J., 2007. *Review Report: AHRC Research Review - Practice-Led Research in Arts, Design and Architecture*. Sheffield Hallam University, Nottingham Trent

University and University of Sheffield: Arts and Humanities Research Council.

Said, E., 1978. *Orientalism: Western Conceptions of the Orient*. New York: Pantheon Books.

Salter, C., 2010. *Entangled: Technology and the Transformation of Performance*. Cambridge, MA: The MIT Press.

Schechner, R., 2013. What is Performance Studies? *Rupkatha Journal*, V(2), pp.2-11.

Scheer, E., 2010. Instance: Granular Synthesis, Modell 5 (2001). In: S. Bay-Cheng, C. Kattenbelt, A. Lavender and R. Nelson, eds., 2010. *Mapping Intermediality in Performance*. Amsterdam: Amsterdam University Press. pp. 115-122.

Scheid, V., 2002. *Chinese Medicine in Contemporary China*. Durham, NC: Duke University Press.

Scheid, V., 2014. Convergent Lines of Dissent: Symptoms, Patterns, Constellations, and the Emergent Interface of Systems Biology and Chinese Medicine. *East Asian Science and Technology Journal*, 8(1) [online]. Available at: <<http://easts.dukejournals.org/content/8/1/107.full>> [Accessed 29 March 2016].

Schiebinger, L., 1998. Lost Knowledge, Bodies of Ignorance, and the Poverty of Taxonomy as Illustrated by the Curious Fate of *Flos Pavonis*, an Abortifacient. In: C.A. Jones and P. Galison, eds., *Picturing Science Producing Art*. London: Routledge. pp. 125-144.

Schlatter, E.N., 2010. Books for Curators: Relational Aesthetics by Nicolas Bourriaud. *elizabethschlatter.com*, [blog] 1 October. Available at: <<http://www.elizabethschlatter.com/books-for-curators/2010/10/1/relational-aesthetics-by-nicolas-bourriaud.html>> [Accessed 25 January 2015].

Schrock, R.D., 2013. Methodological Imperatives of Feminist Ethnography. *Journal of Feminist Scholarship*, 5, [online] Available at: <<http://www.jfsonline.org/issue5/articles/schrock/>> [Accessed 3 July 2016].

Schulzrinne, H., Rao, A., Cisco, Lanphier, R., Westerlund, M., Ericsson AB and Stiemerling, M., 2014. *Real Time Streaming Protocol 2.0 (RSTP)* [online] Available at: <<http://tools.ietf.org/html/draft-ietf-mmusic-rfc2326bis-36>> [Accessed 3 June 2016].

Scott, A., 1998. The Symbolizing Body and the Metaphysics of Alternative Medicine. *Body and Society*, 4(3), pp.21-37.

Schrimshaw, W., 2013. Non-Cochlear Sound: On Affect and Exteriority. In: M. Thompson and I. Biddle, eds., *Sound, Music, Affect: Theorizing Sonic Experience*. London: Bloomsbury. pp. 27-44.

Seegerstrale, U., 2000. Science and Science Studies: Enemies or Allies? In: U. Seegerstrale, ed., 2000. *Beyond the Science Wars: The Missing Discourse about Science and Society*. New York: State University of New York Press. Ch. 1.

Shapiro, A.K., 1964. Etiological factors in placebo effect. *Journal of American Medical Association*, 187(1964), pp.136-138.

Shilling, C., 2003. *The Body and Social Theory*, 2nd ed. London: SAGE Publications.

Singh, Y. and Malhotra, R., 2012. *Object-Oriented Software Engineering*. Delhi: PHI Learning Pvt. Ltd.

Sivin, N., 1993. Huang ti nei ching 黃帝內經. In: M. Loewe, ed., *Early Chinese Texts: A Bibliographical Guide*. Berkeley and Los Angeles, CA: University of California Press. pp. 196-215.

Smallwood, C., 2005. *The Role of Complementary and Alternative Medicine in the NHS*. [pdf] London: Get Well UK. Available at: <<http://www.getwelluk.com/uploadedFiles/Publications/SmallwoodReport.pdf>> [Accessed 12 April 2016].

- Sobo, E.J. and Loustaunau, M.O., *The Cultural Context of Health, Illness and Medicine*. 2nd ed. Santa Barbara, CA: Praeger.
- Spatial Agency, n.d. *The Anarchitecture Group*. [online] Available at: <<http://www.spatialagency.net/database/the.anarchitecture.group>> [Accessed 28 April 2016].
- Spense, D., 2014. Evidence based medicine is broken. *BMJ*, 2014(348), g.22.
- Spivak, G.C., 1999. *A Critique of Postcolonial Reason: Toward a History of a Vanishing Present*. Cambridge, MA: Harvard University Press.
- Springer, 2016. The Chinese Journal of Integrative Medicine. *Springer* [online] Available at: <<http://link.springer.com/journal/11655>> [Accessed 14 June 2016].
- Springer Institute, 2016. *What Is the Difference Between Intercultural, Multicultural and Cross-Cultural Communication?* [online] Available at: <<http://www.springinstitute.org/whats-difference-multicultural-intercultural-cross-cultural-communication/>> [Accessed 10 March 2016].
- Stengers, I., 2010. *Cosmopolitics I*. Translated from French by R. Bononno. Minneapolis, MN: The University of Minnesota Press.
- Sterne, J., 2003. *The Audible Past: Cultural Origins of Sound Reproduction*. Durham, NC: Duke University Press.
- Stock, P. and Burton, R.J.F., 2011. Defining Terms for Integrated (Multi-Inter-Trans-Disciplinary) Sustainability Research. *Sustainability*, 3, pp.1090-1113.
- SuperCollider, n.d. *SuperCollider*. [online] Available at: <<http://supercollider.github.io/>> [Accessed 16 March 2016].
- Tanaka, A., 1997. *Biomuse*. [online] Available at: <<http://www.ataut.net/site/biomuse>> [Accessed 10 May 2016].
- Tanaka, A., 2008. *Atau Tanaka: New Biomuse Demo*. [video online] Available at: <<https://vimeo.com/2483259>> [Accessed 11 May 2016].
- Tate, 2016. *Socially Engaged Practice*. [online] Available at: <<http://www.tate.org.uk/learn/online-resources/glossary/s/socially-engaged-practice>> [Accessed 03 May 2016].
- Taylor, K., 2004. *Chinese Medicine in Early Communist China, 1945-1963*. London: Routledge.
- The Art and Science of Traditional Chinese Medicine, 2014. TCM Today, a Case for Integration. *Science*, 346, pp. S1-S25.
- The Art Surgery, 2009-2010. *Open Art Surgery 01*. [blog] Available at: <<http://doomsburysetartsurgery.blogspot.co.uk/>> [Accessed 21 May 2016].
- The Art Surgery, 2010. *Patients treated at the Open Art Surgery 1st to 23rd of May 2010*. [blog] Available at: <<http://www.mocksim.org/OAS.htm>> [Accessed 21 May 2016].
- Thompson, M. and Biddle, I., eds., 2013. *Sound, Music, Affect: Theorizing Sonic Experience*. London: Bloomsbury.
- Tiainen, M., Kontturi, K.K. and Hongisto, I., 2015. Framing, Following, Middling: Towards Methodologies of Relational Materialities. *Cultural Studies Review*, 21(2), pp.14-46.
- TodaysArt, 2015. *4DSOUND: Circadian*. [online] September. Available at: <<http://todaysart.nl/2015/program/4dsound-circadian/>> [Accessed 5 May 2016].

- Toulmin, S.E., 1990. *Cosmopolis: The Hidden Agenda of Modernity*. New York: Free Press.
- Ubisense, 2016. *Ubisense: Products*. [online] Available at: <<http://ubisense.net/en/products/rtls-platform>> [Accessed 8 May 2016].
- University of Westminster, 2016. *Chinese Medicine Acupuncture BSc Honours*. [online] Available at: <<https://www.westminster.ac.uk/courses/subjects/complementary-medicine/undergraduate-courses/september/full-time/chinese-medicine-acupuncture-bsc-honours>> [Accessed 10 March 2016].
- Unschuld, P., 1986. *Nan-Ching: The Classic of Difficult Issues*. Berkeley and Los Angeles, CA: University of California Press.
- Unschuld, P., 1999. The Past Thousand Years of Chinese Medicine. *The Lancet*, 2000. P.354.
- Unschuld, P., 2003. *Huang Di nei jing su wen: Nature, Knowledge, Imagery in an Ancient Chinese Medical Text*. Berkeley and Los Angeles, CA: University of California Press.
- Van de Poel, K., Vanagt, E., Schrimpf, U. and Gasoriek, J., 2013. *Communication Skills for Foreign and Mobile Medical Professionals*. Berlin: Springer.
- Vanderbeck, R. and Worth, N., 2015. *Intergenerational Space*. London: Routledge.
- Vinod, M.J. and Deshpande, M., 2013. *Contemporary Political Theory*. Delhi: PHI Learning Private Limited.
- Wade, D.T. and Halligan, P.W., 2004. Do biomedical models of illness make for good healthcare systems? *BMJ*, 329(7479), pp.1398-1401.
- Walker, S., 2013. *Helen Chadwick: Constructing Identities Between Art and Architecture*. London: I.B Tauris.
- Wang, R., 2012. *Yinyang: The Way of Heaven and Earth in Chinese Thought and Culture*. Cambridge: Cambridge University Press.
- Wang, X.M., 2011. Lifting-thrusting, rotating manipulations: a comparison of energy input. *Zhong Guo Zhen Jiu*, 31(1), pp. 71–74
- Wang, Y. and Xu, A., 2014. Zheng: A systems biology approach to diagnosis and treatments. *Science*, 346, pp. S13-S15.
- Wellcome Trust, 2015a. *Illustration of the Yin Weimai Pulse*. [image online] London: Wellcome Trust Image Library. Available at: <<http://wellcomeimages.org/indexplus/image/L0034718.html>> [Accessed 16 May 2015].
- Wellcome Trust, 2015b. *Interior and Exterior Relationships of the Twelve Channels of the Hand and Feet*. [image online] London: Wellcome Trust Image Library. Available at: <<http://wellcomeimages.org/indexplus/image/L0034718.html>> [Accessed 16 May 2015].
- Wellcome Trust, 2015c. *Wuzang tu*. [image online] London: Wellcome Trust Image Library. Available at: <<http://wellcomeimages.org/indexplus/image/L0034718.html>> [Accessed 16 May 2015].
- WHO, 2005. *WHO Global Atlas of Traditional, Complementary and Alternative Medicine*. Geneva: World Health Organisation.
- Williams, A. and Srnicek, N., 2013. #Accelerate: Manifesto for an Accelerationist Politics. *Critical Legal Thinking*, 14 May [online] Available at: <<http://criticallegalthinking.com/2013/05/14/accelerate-manifesto-for-an-accelerationist-politics/>> [Accessed 3 March 2016].

Winefield, H.R. and Chur-Hanson, A., 2001, Evaluating the outcome of communication skill teaching for entry-level medical students: does knowledge of empathy increase? *Medical Education*, 34(2), pp. 90-94.

Wiseman, N. and Ellis, A., 1996. *Fundamentals of Chinese Medicine*. Brookline, MA: Paradigm Publications.

Wiseman, N. and Feng, Y., 1998. *A Practical Dictionary of Chinese Medicine*. Brookline, MA: Paradigm Publications.

Wolfe, C., 2009. *What is Posthumanism?* Minnesota, MN: University of Minnesota Press.

Woolard, R., Carty, C., Wirtz, P. Longabaugh, R., Nirenberg, T., Minugh, A., Becker, B., and Clifford, C., 2004. Research Fundamentals: Follow-up of Subjects in Clinical Trials: Addressing Subject Attrition. *Academic Emergency Medicine*, 11(8), pp. 859-866.

Wu, H.Z. and Fang, Z.Q., 2013. *Fundamentals of Traditional Chinese Medicine*. Singapore: World Scientific.

Xth Sense, 2016. *The Xth Sense*. [online] Available at: <<http://www.xth.io/>> [Accessed 8 May 2016].

Xu, L., Meng, M.Q.H., Shi, C., Wang, K. and Li, N., 2008. Quantitative Analysis of Pulse Images In Traditional Chinese Medicine. *Medical Acupuncture*, 20(3), pp.175-189.

Yang, X.Y., Shi, G.X., Li, Q.Q., Zhong, Z.H., Xu, Q. and Liu, C.Z., 2013. Characterisation of Deqi Sensation and Acupuncture Effect. *Evidenced Based Complementary and Alternate Medicine*, Vol. 2013, pp.1-7.

Yuan, H.W., Ma, X.L., Qi, D.D., Zhang, P., Li, C.H. and Zhu, J., 2013. The Historical Development of *Deqi* Concept from Classics of Traditional Chinese Medicine to Modern Research: Exploitation of the Connotation of *Deqi* in Chinese Medicine. *Evidence Based Complementary and Alternative Medicine*, [online] 2013(639302). Available at: <<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3835614/>> [Accessed 10 January 2015].

Zhen, C., 2000. *Crystal landscape of the Inner Body*. Paris: Association des Amis de Chen Zhen. [online] Available at: <<http://www.chenzhen.org/francaise/page.php?id=36>> [Accessed 22 May 2016].

Image References

Anonymous, Qing Dynasty 1644- 1911. *Wuzang Tu (Illustrations of the Five Viscera)*. [ink drawing] (Image: Courtesy of the Wellcome Trust Library). Creative Commons Attribution.

Chen, T., 1763. *Channels and Distributions of the Acumoxa Locations of the Side of the Torso*. [woodcut] (London: The Wellcome Trust Image Library).

Chadwick, H. 1996. *Helen Chadwick Working with Embryonic Tissue at Kings College*. [photograph] (Image courtesy of the Helen Chadwick Estate). London. Photo: Edward Woodman.

Chadwick, H., 1996. *Monstrance*. [cibachrome, perspex] (Image courtesy of the Helen Chadwick Estate). London. Photo: Jonathan Hill/Folly Pictures.

Donnarumma, M., 2011. *Music for Flesh II*. [photograph] (Image courtesy of Marco Donnarumma's own private collection). London. Photo: Daniels, M. Edinburgh: Inspace.

Donnarumma, M., 2015. *0:Infinity*. [photograph] (Image courtesy of 4DSOUND and Marco Donnarumma). Den Haag, NL. Photo: Georg Schroll.

4DSOUND and Lewis-King, M., 2015. *Pulse Project at 4DSOUND*. [digital image] (Image courtesy of 4DSOUND). Budapest, HUN. Photo: Fanni Fasakas.

4DSOUND and Lewis-King, M., 2015. *Pulse Project - Five-Element Interface*. [detail] (Image courtesy of 4DSOUND). Budapest, HUN. Photo: Fanni Fasakas.

4DSOUND and Lewis-King, M., 2015. *Pulse Project – Circadian*. [detail of performance] (Image courtesy of 4DSOUND). Den Haag, NL. Photo: Georg Schroll.

4DSOUND and Lewis-King, M., 2015. *Pulse Sound Sculpture 11* [photograph] (Image courtesy of 4DSOUND). Den Haag, NL. Photo: Georg Schroll.

4DSOUND and Lewis-King, M., 2015. *Pulse Sound Sculpture 14* [photograph detail of audience participation] (Image courtesy of 4DSOUND). Den Haag, NL. Photo: Florence To.

4DSOUND, 2015. *4D Animator*. [screenshot detailing program view] (Image courtesy of 4DSOUND). Budapest, HUN.

4DSOUND, 2015. *Musica Humana Artist Panel Talk*. [photograph] (Image courtesy of 4DSOUND). Den Haag, NL. Photo: Georg Schroll.

4DSOUND, 2015. *Musica Humana Artist Panel Talk* [photograph-audience view] (Image courtesy of 4DSOUND). Den Haag, NL. Photo: Georg Schroll

KVDP, 2010. *Human body meridians*. [image online] Available at: <http://upload.wikimedia.org/wikipedia/commons/f/fc/Chinese_meridians.JPG> [Accessed 30 July 2014].

Li, J., Ming Dynasty - 1436-1443. *Neijing Tu*. [woodcut] (London: Wellcome Trust Image Library).

Moran, P. E., 2011. *Chinese Music, Gamut and Scales*. [image online] Citation for first two columns but with 16384/19683, 131072/177147 and 32768/59049 from: Chen, J.C.Y., 1995. Chinese Music, Gamut and Scales. In: Chen, J.C.Y., 1996. *Early Chinese Work in Natural Science: A Re-examination of the Physics of Motion, Acoustics, Astronomy and Scientific Thoughts*. p. 99. Available at: <https://commons.wikimedia.org/wiki/File%3AChinese_Music_Gamut_%26_Scales.svg> [Accessed 10 March 2013].

Park, L., 2015. *Nue*. [photograph-installation view] (Image Courtesy of Lisa Park and 4DSOUND).

Den Haag, NL. Photo: Georg Schroll.

Park, L., 2015. *Nue*. [photograph performance view] (Image courtesy of Lisa Park and 4DSOUND). Den Haag, NL. Photo: Georg Schroll.

Park, L. 2015. *Nue*. [photograph performance view] (Image courtesy of Lisa Park and 4DSOUND). Den Haag, NL. Photo: Georg Schroll

Rembrandt, V.R., 1632. *The Anatomy Lesson of Dr Nicolaes Tulp* [oil painting on canvas] (Public Domain Attribution). Den Haag, NL. Source: Wikimedia Commons.

Reynolds, D., 2007. *Five Elements: Cycles of Generation and Control*. [image online] Available at; <<http://en.wikipedia.org/wiki/File:FiveElementsCycleBalanceImbalance.jpg>> [Accessed 15 May 2015].

Shen, J., Qing Dynasty 1644-1911. *Interior and Exterior Relationships of the Twelve Channels of the Hand and Feet*. [woodcut] (London: Wellcome Trust Image Library).

Wang, S., 180-270 CE and Shen, J., Ming Dynasty - 1368-1644. *Yin Weimai Pulse Image*. In: *Renyuan maiying guizhi tushuo* (Pictorial Handbook of Pulse Images Based on the Person). [woodcut] (London: Wellcome Trust Image Library).

Appendix I

Glossary

Ableton Live – is an audio software music sequencer and digital audio workstation that is designed as a tool for both live performance or studio production. Created in 2001, Ableton Live's software is written in the programming language 'C++.' Its interfaces allow it to be connected with samplers, MIDI controllers, Max/MSP (see definition below) and other music software programs. See Ableton, 2016, n.p.; Marguiies, 2014, pp.1-2.

Art, Science and Technology (AST) – is a term that refers to an emergent global network/community of interdisciplinary and transdisciplinary researchers and producers who work across art, science and technology sectors. AST also bears some relationship with current political struggles at the governmental and educational level in the US – as aspects of AST have been used as a model example for demonstrating the ways in which arts contribute knowledge to mathematics and sciences fields and therefore should be given a place within the national curriculum alongside standard STEM (science, technology engineering and mathematics) subjects. To support the recent emergence of AST, several galleries and organizations have sprung up to feature and disseminate this practice. For example, the Arts Catalyst – an organization that has commissioned art, science and technology projects for twenty years – have now launched a new center that commissions and produces new works in this field. See: Arts Catalyst, 2016, n.p. See also MIT, 2012, n.p.

Chinese medicine – Chinese medicine (CM), very simply defined, examines the temporal relationships between living organisms, nature and cosmological influences and seeks for ways (by deeply apprehending these interior/exterior, natural/cosmic relationships), to augment the well-being and longevity of living beings – particularly of, but not exclusively, humans. See Unschuld, 1999, p.354.

Culture – Professor of Culture and Psychology David Matsumoto writes that: 'culture is as much an individual, psychological construct as it is a social construct. To some extent, culture exists in each and every one of us individually as much as it exists as a global, social construct. Individual differences in culture can be observed among people in the degree to which they adopt and engage in the attitudes, values, beliefs, and behaviors that, by consensus, constitute their culture.' (Matsumoto, 1996, p.18)

Hun – Chinese medicine scholar Giovanni Maciocia writes that the *hun* is a bodily 'spirit' housed in the Liver that:

'broadly corresponds to our Western concept of "soul"... Ethereal in nature, after death it survives the body and flows back to 'heaven', tian; this is the ancient Chinese concept of 'heaven' i.e. a state of subtle and non-material energies and beings, and has therefore nothing to do with the Western and Christian concept of "heaven." The ethereal soul can be described as "that part of the soul (as opposed to corporeal soul) which at death leaves the body, carrying with it an appearance of physical form."' (Maciocia, 1993, n.p.)

Qu and Garvey (2006, n.p.) further clarify the bodily role of the *hun* by remarking that 'the liver-*hun* participates in the perception of visual information and in the movement and function of the joints.'

Immanent – the Oxford dictionary defines this term as 'existing or operating within: inherent' (Oxford Dictionaries, 2016, n.p.). However, for the purpose of this thesis, this term is used within the context of traditional Chinese thought in the manner in which Huang discusses: 'Unlike the

Western tradition's stress on transcendence of the creator of all being, the Chinese tradition emphasizes the immanence of the vertical dimension in [metaphysical] process' (Huang, 2009, p.145). In other words, 'the Chinese tradition of the world is not considered as a product of an external creative act' (p.145).

Inscription – Latour and Woolgar define inscription as a 'phenomenotechnique' (1979, p. 63), a written or hand-drawn process that enables the 'transformation of material substance into a figure or a diagram' (1979, p.51). The inscription document is considered as a 'real' representation of phenomena because (within the context of scientific laboratories) inscription 'is regarded as having a direct relationship to "the substance"' (p.51).

Intercultural Communication – is defined (as it relates to the aims of this project) as communication across cultures where there is mutual interaction, with the specification that communication includes a comparative analysis or synthesis of specific cultural identities and differences. This is in contrast to multicultural and transcultural communication. Multicultural enacts a communication that assembles different cultural communications in association with each other, but there is no intercommunication or integration occurring between cultures. Transcultural communication assumes there is no true 'separation' between cultures and that diverse expressions of cultural communication from various countries and locales are holistically integrated into an overall synthesis of cultural communications. See Van de Poel, et al., 2013, pp.6-7; Springer Institute, 2016, n.p.

Jingluo – this translates as the channel-networks or meridians that move *qi* between the *zangfu* (organs) and the extremities of the body (see Wisemen and Feng, 1998, p.55).

Lifeworld – according to Hirsch Hadorn and colleagues, this term refers to problem-situations that exist in the world (both locally and globally), such as sickness, poverty, inequality, and so on. This term and its function in research (to identify research problems) aims to make research (more specifically scientific research) more answerable to real world 'problems of the 21st Century' (Hirsch Hadorn, et al., 2008, p.4). I use this term in this research to signify the complex interplay between personal, local and global processes.

Max/MSP – is an interactive visual programming language for music and multimedia 'that allows an individual to accomplish a musical task, typically in real-time, through some interaction. Though commonly associated with composition and performance, the tasks associated with interactive music systems can include analysis, instruction, assessment, rehearsal, research, therapy, synthesis, and more' (Manzo, 2011, p. xiii). Max/MSP has been developed for over twenty years by 'Cycling '74', a San Francisco based software company (Max was originally developed by Miller Puckette).

Mode 1 and Mode 2 Research – 'Mode 2' research is defined by Hirsch Hadorn, Pohl and Scheringer in contrast to 'Mode 1' research. They define Mode 1 and Mode 2 in the following passage: '[Mode 1] Stands for a linear model of knowledge production, starting from within basic science [as] an independent and somehow protected area, followed by the field of applied science, in which knowledge is tested and used and to which actors from outside academia come to take up the knowledge and transform it by way of the industrial-economic complex into marketable products. In contrast to Mode 1, [Mode 2] knowledge is developed from the very beginning within a particular context of application, whereby knowledge from outside and inside academia is merged to fulfil a particular task and the places of knowledge production are distributed among several locations in society.' (Hirsch Hadorn, Pohl and Scheringer, 2009, p.25) Hirsch Hadorn's, Pohl's and Scheringer's definition places emphasis on the integrative aspects of knowledge production that take place in Mode 2 research – aspects that create an advancement of knowledge that

extends the 'traditional' approach to knowledge production characteristic of Mode 1 research (as defined above). For further reading on the original definitions and applications of Mode 1 and Mode 2 research, see Gibbons, et al., 1994.

Placebo – This term is defined by A.K. Shapiro, a psychiatrist and highly influential writer on placebo, as: 'any therapeutic procedure (or a component of any therapeutic procedure) which is given (1) deliberately to have an effect, or (2) unknowingly and has an effect on a symptom, syndrome, disease, or patient but which is objectively without specific activity for the condition being treated. The placebo is also used as an adequate control in research.' (Shapiro, 1964, p.136)

Plastic – this term refers to the creative 'act of giving form' (Malabou, 2005, p.8) or to modelling and shaping ideas or phenomena.

Po – this term refers to the 'corporeal soul,' a spirit essence that is housed in the Lungs. Maciocia defines the *po* as: 'that part of the soul (as opposed to the ethereal soul) which is indissolubly attached to the body and goes down to earth with it as death. It is closely linked to the body and could be described as the somatic expression of the soul, or, conversely, the organizational principle of the body' (Maciocia, 1993, n.p.). The *po* is associated with the waxing and waning process of the moon - a metaphoric image that is used to allude to the *po*'s role in regulating the daily physiological processes of the body, especially breathing and all 'exiting and entering' processes, e.g., excretion and ingestion (see Maciocia, 1993, n.p.).

Practice-Based Research (PBR) – the Creative Cognitive Studios, University of Technology Sydney provides one of the clearest definitions of this term within an academic context, defining it as the following:

'Practice-based research is an original investigation undertaken in order to gain new knowledge partly by means of practice and the outcomes of that practice. Claims of originality and contribution to knowledge may be demonstrated through creative outcomes which may include artifacts such as images, music, designs, models, digital media or other outcomes such as performances and exhibitions. Whilst the significance and context of the claims are described in words, a full understanding can only be obtained with direct reference to those outcomes.' (CCS, n.p., n.d.)

Pure Data - a real-time graphical programming environment for audio, video, and graphical processing developed by Miller Puckette (Di Liscia n.d., n.p.).

Sclang – is a SuperCollider programming language that uses an object-oriented and functional language syntax similar to C programming language (see SuperCollider, n.d., n.p.).

Scsynth – is a SuperCollider synthesis server that supports multiple input and output channels and uses a 'bus system' to match programming commands with sound objects (see SuperCollider, n.d., n.p.).

Shāng diào scale – is an early Chinese tuning method that uses *shāng* as the fundamental tone for tuning a pentatonic scale (see Chen, 1996, pp.50-51).

Shén – is the central 'spirit' (a separate concept from the term 'spirit' in Greek-Judeo/Christian thought) of the body that governs the overall processes of the body and also oversees the other four spirits of the body, e.g., the *hun* (ethereal soul), *po* (corporeal soul), *yi* (intuitive intellect) and *zhi* (the will). This spirit is linked to, and is a part of, the cosmic consciousness of the universe. The *shén* is housed in the Heart and is anchored into the body via the blood (*xue*) – thus the *shén* also governs the blood and the vessels. The *shén* connotes the psyche, thought, memory, insight,

consciousness and the emotions (see Maciocia, 2012, n.p.). *Shen* is also translated as the 'body' and the self as a 'sentient' being (see Furth, 1999, pp.19-20).

Tacit Knowledge – this can be defined as experiential knowledge that cannot be explicated wholly within language. It is an embodied, somatic form of knowing that is both individual and collective and is inherently relational, i.e., it accumulates between the body (and collective bodies) and the world (see Collins, 2010, pp.1-3).

Technoetic – Roy Ascott, who has coined this term, defines it as 'a new artistic sensibility arising from the confluence of art, technology and consciousness research... More than simply marking the meeting of mind and machine... technoetic is intended to signify the symbiosis of technology and consciousness' (Ascott, 2000, pp.1-2).

Qi – is described as an all-pervasive life force that exists both within and without the body and forms one of the most fundamental principles in Chinese medicine and science. It is the material of transformation itself. The range of transformations are as wide as the cosmos - from the density of a white dwarf to the briefest emission of atomic particles. In Chinese medicine, practitioners manipulate the flow of this energy to assist healing according to Chinese medical principles (see Rose and Zhang, 2001, pp.-ix; Eisenberg and Wright, 1995, pp.1-4).

Wǔxíng – Often called the 'five phases' or elements (Earth, Fire, Metal, Water and Wood), this term describes a systematisation of phenomena into five distinct movements or phases - phases that describe the movement and characteristics of the changing seasons of spring, summer and so on. These elements have a specific order and inter-relationship with each other. One element may generate or control another, i.e., winter generates spring, whereas autumn is in contrast to spring. These elemental phenomena can be used to describe the phasic interaction between cosmological entities or between the organs of the body (see Rochat de la Vallée, 2009; Unschuld, 1986, p.18).

Xuè – This substance translates as 'blood' and corresponds to the biomedical understanding of blood, but is also conceived of as a *yin* essence substance that both moves and is moved by *qi* (see Wiseman and Ellis, 1996, pp.21-22).

Yi – Maciocia defines this 'spiritual aspect' of the body as the intellect and writes:

'The intellect resides in the spleen and is responsible for applied thinking, studying, memorizing, focusing, concentrating and generating ideas. The postnatal *qi* and blood are the physiological basis for the intellect. Thus if the spleen is strong, thinking will be clear, memory good and the capacity for concentrating, studying and generating ideas will also be good. If the spleen is weak, the intellect will be dull and thinking will be slow, memory poor and the capacity for studying, concentrating and focusing will all be weak. In the sphere of thinking, remembering and memorizing there is considerable overlap between the intellect (spleen), the mind (heart) and the willpower (kidneys).' (Maciocia, 1993, n.p.)

Yin-yáng – describes two opposing yet interdependent and interconnected primordial forces that form the basis of the movements of life and consciousness. The *yīn-yáng* principle is materialised by phenomenal cyclical process, such as day and night, heating and cooling, accelerating and decelerating, expanding and condensing, and so on. This continually shifting pair of opposites constitutes the fundamental basis for early Chinese philosophy and science (see Wang, 2012, p.76).

Zàng-fǔ – *zàng* refers to the five *yīn* organs of the body: Heart/Pericardium, Spleen, Liver, Lung, Kidney. *Fǔ* refers to the six *yáng* organs: Large Intestine, Small Intestine, Gall Bladder, Urinary Bladder, Stomach, Triple Burner. These *zàng-fǔ* each have an associated channel that extends

and transports the energy of the organs along points across the body. A simple definition of the functions of the *zàng-fǔ* - the five *yīn* organs are said to 'store' and produce essential fluids, while the six *yáng* organs 'transform' essences into the production of energy and dynamic movement (see Maciocia, 2015, pp. 103; Unschuld, 1986, p.18).

Zhi – Maciocia defines this spiritual aspect of the body as 'willpower,' which is housed in the Kidneys. As the Kidneys influence and store information, the *zhi* determines long-term memory. Maciocia writes:

'the kidneys house willpower, which indicates drive, determination, single-mindedness in the pursuit of goals and motivation... if the kidneys are strong, the willpower is strong and the person will have drive and determination in the pursuit of goals. If the kidneys are depleted and the willpower weakened, the person will lack drive and initiative, will be easily discouraged and swayed from his or her aims.' (Maciocia, 1993, n.p.)

Appendix II

Touching as listening



Michelle Lewis-King

Artist-Acupuncturist

One of the fundamental characteristics of my practice as an artist-acupuncturist is an enduring interest in the ecology of the human body and its processes, for instance: an interest in the ecosystems and rhythms of the body, in sensorial experience, and in thinking of the body as a landscape.

Another key characteristic of my practice is an interest in social engagement, in looking at the aesthetic, anthropological, social and ethical concerns that arise from the ecological interrelationships between self, society and nature.

My current (doctoral) research project brings together my transdisciplinary expertise in the fields of Chinese medicine, fine art, multimedia, performance and sound art. In 2011, I began Pulse Project, an ongoing performance research series that draws upon my experience as an artist-acupuncturist working within the contexts of the biomedical clinic.

Pulse Project transports the hidden and intimate experience of the clinical encounter into the public domain through 'restaging' the Chinese medicine clinic. In these performances, the clinical methods of conducting pulse readings, case history consultations, clinical notation, and the composing of treatment

principles and prescriptions are all repurposed into artistic methods: the clinical notes become graphic notations (a music score that goes beyond traditional music notation by using images, drawings or symbols to represent notes or sounds), the formulation of treatment strategies, principles and prescriptions are translated into the process of composing bespoke musical pieces, and so on.

I use these creative adaptations of the clinical encounter as research tools that enable me to investigate and record the social encounter between self and other and also as a means for reimagining the possible relationships between art and medicine; to reveal the 'art' within medicine and the 'medicinal/transformative' aspect within artistic practice.

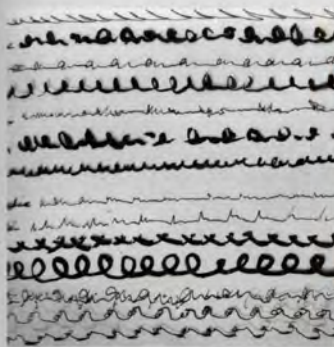
Notation process

Pulse Project soundscapes are composed to describe a relationship of 'thinking-as-caring' - of listening to and caring about another person as an ethical creative act. I meditate upon each person's pulse not simply as a set of diagnostics, frequencies, waves and rhythms, but as a considered, playful and caring (therapeutic) response to the life of each person and to their act of generosity in offering of themselves to be read by me.

During each performance, I produce notations of participant's pulses as a live translation of the waveforms of the entire zàng-fū cosmology of the participant's pulse at a specific moment in time. These notations form a record of the circuit between others and myself - as an inscription of the moment of my breathing (and their breathing), of touching (and being touched), of listening (and being listened to), of interpreting and responding (and being interpreted and responded to).

The notations are also a crucial aide memoire to the composing process of each soundscape, as the lines of the notations remind me of the sensation of each waveform impression of their pulse. The strength and weakness of each line visually demonstrates the strength or weakness and unique signatures of each waveform felt on the six locations of the wrist.

These notation inscriptions extend beyond the classical pulse images (for example bowstring/xián 弦, tight/jin 緊, slippery/huá 滑, etc) to describe more than just clinical 'data', as I perceive/intuit something about each person from the moment of being literally in touch and listening deeply through perceptive touch to the



emergences of another's being. This 'something' intuited could be an image that suddenly arrives in my mind or a suggestion of a particular musical signature or cadence. Each of these 'extra' impressions assists in my meditation on each person as a unique symphony of embodied being-in-time.

Theory and composition

To compose each soundscape, I use Chinese pulse diagnosis and traditional Chinese music theories together with digital technology. In working with audio software and multichannel speaker systems, I'm able to transform the graphic notations into shifting spatial soundscapes - giving shape, dimensionality and expression to the alchemical (wǔxíng) rhythms, streams and patterns of infrasonic interior of the body.

I base my soundscapes on findings from recent research that tests the 'five pitch' theories of the Huang Di Nei Jing within clinical trials. According to Gao et al and Liu, et al, the 'ideal' pitches each of the zàng-fǔ oscillate at and respond best to are as follows:

- heart/small intestine - zhǐ - fire pitch: 399 Hz
- spleen/stomach - gōng - earth pitch: 264 Hz
- lung/large intestine - shāng - metal pitch: 295 Hz
- kidney/bladder - yǔ - water pitch: 440 Hz
- liver/gall bladder - jué/jiào - wood pitch: 350 Hz.

Accordingly, I adopt these frequencies to compose my pulse soundscapes. Selecting the appropriate pitches for each participant is based on assessment of the specific and overall characteristics of the participant's pulse according to the therapeutic principles of Chinese pulse analysis. This aim to promote wellbeing within the creation of soundscapes is the same 'aim' I observe in creating a 'treatment principle' in my clinical practice.

Each composition is titled according to the diagnostic characteristics of participants' pulses. For example, a composition created for a man in his 40s is titled as: 40 yrs, male, yǔ [Water] Pulse, Yin Xū, Fine. Treatment Principal: Cool Empty Fire and Sedate Liver-Yang Rising, Tonify Yin. In this participant's reading a very thin and rapid quality was felt on the kidney yin position of the pulse. This 'weak' quality was contrasted by an overly strong, percussive and rapid quality felt in the gall bladder position.

To create a sonic composition that would 'harmonise' the overall pitches of the zàng-fǔ jīng-luò of this individual, the pulse impressions indicate that boosting the water pitch, decreasing the wood pitch and slowing the pace of the entire composition down would all benefit this individual. The water

element (yǔ) with a pitch of 440 Hz was considered to be the most beneficial tone for this individual overall and therefore forms the fundamental pitch for the tuning of the pentatonic scale of this composition. The pitches/frequencies of each zàng-fǔ jīng-luò within each composition are amplified or diminished order to balance the 'five tones.'

Feedback

These soundscapes offer new zones of 'relational listening' - listening both to the body and to the act of listening itself. In my work I look to separate out the swift and easy relationship between a cause and its effect that typically occurs during the scientific/medical investigation process: I am interested in the materiality of the diagnostic process, in exploiting, teasing out and elongating the moment of experimental inscription and play that exists between the construction of logical scenarios in the clinic. When the diagnostic process becomes purely creative, a physician is free to 'play'.

Conversely, the artistic investigation of Pulse Project has made it possible for me to open up new zones of reflection, imagination and innovation within my own acupuncture practice. For example, when taking case histories and reading pulses, I listen to and notate information that exists both within and outside of the classical nosologies of biàn zhèng (辨证) to capture a more bespoke 'portrait' of what might be occurring within another person. In this way, the creative processes of listening and playing have added extra dimensions to the 'problem solving' processes inherent in diagnostic thinking and treatment strategy formulation.

Lastly, by using artistic research to illuminate/demonstrate the alchemical interchanges between art and science that take place within Chinese medicine to a broad audience, this artistic research also works towards engaging the public in the practice of, and concepts of, Chinese medicine.

As this is a short article, I cannot provide a full account of participant feedback to my performance research, so I provide here just one participant's commentary about their impressions of the performance encounter and listening to the pulse soundscape that was composed uniquely for them. This participant's remarks are indicative of the resonant interpersonal communications created between researcher and participant that have formed

The artistic investigation of Pulse Project has made it possible for me to open up new zones of reflection, imagination and innovation within my own acupuncture practice

such an important aspect of this project:

'Moreover, not every biological process taking place in our bodies is fully explained and understood even in "sophisticated" western medicine, so maybe searching for the new unconventional methods like you do leads us to understand our own species in a totally different way. Although pulse reading has a long history and today it gives us lot of information about the functioning of some of our internal organs, your method is an amazing way

to hear it in a way we never did ... from beat to ambient music ... it makes me think that my body has not only rhythm but also it's own unique melody.'

For spatial sound details) 4dsound.net/overview/ and tinyurl.com/zdqk7gh

To listen to Pulse Project soundscapes) soundcloud.com/cosmosonicsoma/sets (use headphones and turn the volume up to the required frequency as each soundscape varies in volume to reflect participants' pulses.

To read more) www.codephd.wordpress.com

Gao D, Chen AG, Gao YT and Shi S (2010) The Five Organs Harmonise Pitch: Modern research and clinical treatment of the lost theory and technology in 'Huang Di Nei Jing.' *Journal of Accord Integrative Medicine*, 6(2), pp.75-92

Lui WQ, Wang Z, Yu WL, Chen Y, Jiang YT, Huang JP and Jin L (2010) Study on relationship between five Chinese tones sequence and human pulse wave. *China Journal of Traditional Chinese Medicine and Pharmacy*. 12, pp.2006-09

Michelle Lewis-King's creative practice research investigates the cultural interfaces between art, medicine and technology. She works collaboratively with artists, musicians, scientists and technologists, most recently at 4DSOUND Studios Budapest, Hungary and The Port @ CERN, Geneva, Switzerland.

Touch as techne: rethinking digitality

Michelle Lewis-King

Cultures of the Digital Economy Research Institute, Anglia Ruskin University
michelle.lewis-king@pgr.anglia.ac.uk

Abstract:

This paper introduces *Pulse Project* (2011 -), a doctoral performance research project that engages in critical discourse between art and science through the creation of digital soundscapes that weave together artistic, medical, technological, ancient and modern methodologies. Pulse “reading,” case histories, notations of pulses and programming soundscape compositions are all used together as methods for exploring the cultural encounter between artist, participants and diverse medical practices.

Pulse Project seeks to provide an examination of the means with which the temporal materiality of touch can be used together with audio programming to form a translation and synthesis of different ecologies and disciplines, e.g., medicine and art, eastern and western practices, touch and digitality, etc. Drawing upon my experience as a clinical acupuncturist (with training in biomedicine), I use Chinese pulse diagnostics together with SuperCollider (an audio synthesis programming language) to inform the composition process of each soundscape. In this way, *Pulse Project* interrogates the aesthetic and philosophical axioms underpinning contemporary medicine, technology and cognitive embodiment through the exploration of their corollary “others” - traditional Chinese medicine and music theory - in order to generate a fresh approach to embodiment and soundscape composition.

Keywords:

Art, science and technology, SuperCollider, Chinese medicine and performance art, Soundscape studies.

1 Introduction

Pulse Project positions the haptic and somatic into play with the digital by using intuitive and informed touch in tandem with SuperCollider (a real-time audio synthesis programming language) to create unique soundscapes expressive of the invisible and inaudible aspects of an individual’s embodied being. *Pulse Project* soundscapes are generated by using touch informed by Chinese medical theory as an alternate and comparative means for exploring and recording the intersubjective space/time between self and others. In this way, this study generates an ecology of embodied soundscapes that convey unique sonic spaces hidden within and between each person. These soundscapes are not interpretative of the western notion of the circulatory system, but instead draw on Chinese medical philosophy in order to represent the body as a living cosmos pulsating with matter and energy.

As human touch bridges self with other, the development of a ‘technology of touch’¹ based on the model of early Chinese pulse diagnostics is being used in this study to challenge and extend contemporary artistic, medical and technological practices (Lewis-King, 2013). Pulse reading is used in this performance/sound research study as an instrument of convergence between art and medicine, east and west, past and present, self and other. Each participant’s pulse is interpreted as a unique set of sound wave images that are based on the theories of traditional Chinese pulse diagnostics (a complex set of 28+ waveform images corresponding to mental/physical states of being) and also in

accordance with traditional Chinese music theory. The establishment of a 'technology of touch' is also being developed in this study as a hybrid digital methodology for generating forms of embodied sound that run counter to the trends within 'interactive' media that places its emphasis on the mechanical measurement of participant's vital signs, i.e., sonifying data from biosensors, stethoscopes and forms of technology which rely on mathematical calculations as the golden mean for representing the interior of the body and embodiment (Lewis-King, 2013).

This article uses touch to re-examine contemporary notions of *techné*², as touch is used in the context of *Pulse Project* as a 'tool' of convergence capable of bringing together the diverse practices of art, science, (medicine) and technology as well as to bring the research investigator into 'touch' in unique ways with participants of the research. In section 2, the exploration of touch that is used in *Pulse Project* will be first be grounded through the framework of my own personal experience as a transdisciplinary practitioner of both art and science practices and secondly, through exploring the ecological context of *Pulse Project* performance. In section 3, I outline the practical and theoretical details of my performance study *Pulse Project* and provide a basic account of Chinese Medical and Music theories in relation to my composing bespoke algorithmic compositions. In section 4, I provide a critical context in order to situate my creative research practice within a contemporary field of digital performance and also to further develop a discussion on touch in relation to *techné*. In section 5, I present my conclusions to make the case for why *Pulse Project* offers a unique contribution to the ecological study of sound and digital creative practice.

2 Pulse Project: Bringing Transdisciplinary, Cross Cultural and Interpersonal Practices into Touch with One Another

One of the fundamental characteristics of my practice as an artist and acupuncturist is an enduring interest in the human body and its processes, e.g., a fascination with the ecosystems

and rhythms of the body, in sensorial experience, in thinking of the body as a formal landscape, etc.

This fascination with the body and embodied process is complemented by another key concern, which is characterised by my practical and theoretical meditation on the aesthetic, anthropological, social and ethical aspects that arise from the ecological relationships between the self, others and culture. In my work I explore these ecological relationships between the self, others and cultural practices from an embodied and transdisciplinary perspective, one that draws on my experience of training and working in artistic, scientific and anthropological contexts.³

My transdisciplinary practice manifests as a creative engagement with the ontology of listening to and 'caring' for others from the two processual 'advantages' of art and science as well as from the perspectives of both Eastern and Western cultural practices (Lewis-King, 2014). Another fundamental basis for my creative practice research arose from an interest in the theoretical discourse of the Other.⁵ When practicing one discipline, I remained curious of perspectives that differed from the mono-logic of that particular discipline and from my own personal perspective. It was this curiosity and a continuous engagement with divergent perspectives and material practices that led to my working across the fields of art and science. It is in this spirit that my current research utilises my artistic practice in tandem with my clinical experience as an acupuncturist – by bringing artistic inquiry into dialogue with intercultural scientific 'techniques', e.g., the investigation of patients' 'conditions' and the formulation of treatment strategies according to the knowledge systems and traditions of Chinese medicine but from within the context of the western biomedical clinic.⁶ Given this experience, the aim of my research is to formulate a sonic practice that critically explores art, medicine and technological practices from a broader ecological perspective – where Western approaches to ontological, scientific and technological practices are not the dominant perspective (Lewis-King, 2014).

To investigate one knowledge system by

placing it in touch with another knowledge system is not a unique strategy in the arts and humanities, after all, John Cage used Zen Buddhism to inform his compositions (Larson, 2013). Along similar lines, philosopher Francois Jullien asks to 'what extent' as a civilisation have we ever been able to disembark from and think outside of our inherited 'European schema' (Jullien, 2004) that perpetually reiterates thought processes formed during early Greek civilisation. Jullien states that these schematic processes are so deeply embedded in our thinking that we no longer see the foundations for such schema, but nonetheless use this schema to continually culturally construct goals and then go about fulfilling them as if they were a matter of fact (2004, 1). Here Jullien remarks during an interview that he studies Chinese philosophy to:

get out of the Indo-European zone, notably the great Indo-European language, by breaking with its syntactic modes and etymological roots ... whereby China provides us with an exteriority which enables us to tackle European thought from the rear... to discover other modes of intelligibility ... which does not mean that I presuppose them, and to conversely probe the prejudices of our reason.
(Zarcone, 2003, 15).

Whilst taking care to avoid 'orientalism' in my research, I use my clinical practice of Chinese medicine within a western biomedical context with a similar approach to that of Jullien's - as an object of inquiry, critique and analysis between knowledge systems.

2.1 Pulse Project in Situ

To ground *Pulse Project* within an ecological context, I examine 'Pulse Project' in relation to Situationist Theory. Loosely defined, Situationism states that the given factors of a situation are more useful for determining the behaviour of actors within the situation than any inherent 'virtue' of the actors in the situation, e.g., their morals, values, attitudes, etc (Kamtekar, 2004). In establishing a focus on an

environment and a given situation as the key factor that determines the types of interaction and outcomes of activities in this study, I also adopt psychologist James J. Gibson's (Situationist) terms 'affordances and constraints' to provide an analysis of the situational 'factors' of *Pulse Project*. Gibson's affordances can be defined as the following: 'In any interaction involving an agent with some other system... affordance refers to whatever it is about the environment that contributes to the kind of interaction that occurs' (Greeno, 1993, 338).

Pulse Project uses the 'affordances' of performance and diagnostic touch in order to create interactive processes in which one agent (the investigator) directly interacts with other actors/agents (the participants in the study) within a given environment in order to create a new form of social activity and creative production (Greeno, 1993). Within this performance study, the interactive processes are both physical and symbolic. The physical process involves the interactive co-performance of the participants' active and passive forms of participation in relation to my reading their pulses. Whereas the symbolic process involves the interaction between what agents understood and did not understand about the medical concepts (symbols) of biomedicine and Chinese medicine within the environmental context of the performance. In addition to interaction between agents and symbolic systems (medicine), there is also an interactive process between these two forms of medicine themselves in this performance study, i.e., an interaction between biomedicine (a form of medicine that all participants were familiar with) and Chinese medicine (a form of medicine that most participants were unfamiliar with but were curious or dubious about).⁷ These forms of interaction allowed me to use touch to generate new forms of interpersonal activity, discussion and creative output.

Rather than situating my performance research in a particular location within particular communities, 'Pulse Project' is located within the matrixial⁸ interstices (Ettinger, 2005) of the embodied interpersonal (internal) space-time that touch creates between one person and another. Although these performances take place in public

locations, the focus of this study is not on the exterior factors of the immediate environment of the performance, but rather, this study is concerned with the interconnected and converged environment between oneself and another as it is outlined in the rubrics of Chinese medicine. Therefore the Chinese medical encounter between a practitioner and participant is being used in this study to explore and demonstrate the phenomenal ecology of intersubjective embodying through the 'affordance' of reading participants' pulses according to Chinese pulse diagnosis.

In this study, I use Chinese medicine as a system of knowledge that 'allows' me to perform a particular investigation (pulse taking) that offers an alternate means for measuring and understanding the embodied experience. This method - Chinese pulse diagnosis - also allows me to use an older system of knowledge to reconsider and interrupt the standard approaches for mediating inter-personal relationships and embodied processes within the clinical encounter. Through my reimagining and performing the behavioral 'codes' and diagnostic 'techniques' used in the clinical encounter differently, participants are enabled to ask questions during the performance that lead them to recreate and reinterpret the 'biological' processes occurring within their own bodies and also question what connecting with a 'practitioner' in this new way might signify. This allows for us as actors to co-perform a new kind of medical investigation through the use of a 'constraint'⁹ (Chinese pulse diagnosis) - the constraint allows us to reinterpret and reinvent what medicine can 'become'. Within the space of the performance, any strict divisions between the activities of art and medicine also become indistinct. At the same time, I also use a pre-modern knowledge system as an 'affordance' to question any hegemony within the relationship between contemporary western biomedicine and its corollary 'other' - traditional Chinese medicine.¹⁰

2.2 Some Ecological Significances of *Pulse Project*

One of the significant 'meaningful' outcomes of the performance (in terms of ecology) is produced through collaborative communication between the participants and myself. This communication allows us to co-create new connections between medicine and art. 'Meaning' is also provided through the affordance of the performance in that *Pulse Project* performance offers participants a situation where they can connect intimately with another person under circumstances that are public yet ambiguous. The context of the performance allows people to meet in a safe environment, exchange thoughts, expressions and creative works. The touching of others and reading their pulse (this action is in itself a form of 'question' in regards to the being-in-timeness of others) affords for not only new dialogues about art and medicine, it also allows for the creative production of 'records' of the event. The resulting clinical notes, graphic drawings and composing of soundscapes from participant's pulses produce an aural and visual subtext of the moment of interaction within the performance encounter as each notation, graphic drawing and soundscape composition are physical 'traces' of the interaction between investigator and participant. Meaning is produced in through poetic recall of the particular moments that the internal environments of the person touching (the investigator) and the person being touched (the participant) were brought into communication with each other within the performance situation.

In terms of the ecology of embodiment, my approach to embodiment in '*Pulse Project*' differs from the standard (western) philosophical approach founded on theories such as 'embodied cognition' and the 'embodied mind thesis'. Within these embodiment theories, the body maintains the lesser position of 'vessel' for the higher functions of the mind, e.g., the mind's ability to carry out 'cognitive tasks', to reason, to develop visual schematics and linguistics, etc (Hirose, 2002; Lakoff and Johnson, 1999). Even the 'embodied mind thesis', which attempts to ascribe the body with a more active role, adopts a 'fixed' and 'causal' theoretical approach to embodiment that is still inadequate to address the more temporal and contingent aspects of *embodying* (Hirose, 2002; Lakoff and Johnson,

1999). As cognitive psychologist and researcher Naoya Hirose asserts, 'ecological studies ... remind us of the significance of embodying and demonstrate that the act of embodying can be investigated experimentally' (2002, 296) and goes on to argue that in order to conduct research in a way that can truly address the physical actions of embodying, 'Research on cognition should not be limited to intracranial and intradermal processes' (296). 'Pulse Project' thus explores embodiment and embodying from the more relational and ecological perspective of Chinese Medicine.¹¹ The Cartesian divisions between the body and the 'higher reasoning' of the mind as well as the schematic distinctions between the phenomenal processes of the body, the 'natural' environment and the universe that deeply influence western epistemologies up to this day - do not exist in the same absolute manner in Chinese philosophy and medicine.

Human touch registers the constant flux of *embodying* and Chinese pulse diagnosis affords a technical system that can embrace interactive phenomena in motion through the perceptive 'systems' of the body. In *feeling* and interpreting the pulse of others, the living body of the participant can be perceived and recorded by the agent through the affordance and constraint of Chinese pulse diagnosis. In this way, the system of Chinese medicine emulates the 'natural' and 'cosmological' processes of temporal time-space and connects the investigator/agent with the participant of the study through haptic perception. An in depth explanation of the methodology of Chinese pulse diagnosis is provided in following section.

3 Pulse Project

Through the daily experience of practicing acupuncture, particularly as the clinical encounter is co-performative (Conquergood, 1991), I began to regard the body-in-being *itself* as an artistic medium. As an artist-acupuncturist working between biomedical and early Chinese medical principles, clinical practice became highly performative in all senses of the word, blurring the distinctness of self and others (particularly when placing needles beneath the

skin's surface) so that my clinical practice became an transdisciplinary space of performative experimental intervention and intimate inquiry into the indeterminate spaces between self and other, a space of healing and transformation. Directed by these experiences, in my creative practice, I place emphasis on touch, temporality and subjective interactivity that takes place within the Chinese medical encounter as a means with which to *embody* a methodology that is capable of apprehending, measuring and transforming the interpersonal dynamics of 'living' bodies-in-being.

In this section I present *Pulse Project*, (2011 -) an art-as-research sound study that explores Chinese pulse diagnostics as a unique source for connecting art with science and for connecting performance with sound studies. This project investigates the use of intimate touch as a means for connecting with others and for producing embodied sounds that explore the situational space/time between self and other introduced in Section 2. It is important to point out that the participants engaged in this research are of equal importance to the aims of research and the role of the researcher (myself) within the study (Koski, 2011). What makes this study different from other sonic and creative practice studies is its exploration of the sonic possibilities within the interior of the body when considered from a perspective alternative to standard practice in western medicine and technology (Lewis-King, 2013).

In using pulse reading to touch upon the internal oscillations of others, touch is used as a method of intensive listening that enables me to translate the oscillations of subtle energies and flowing of blood within the interior universe of another into a uniquely individualised soundscape. The palpation of pulses requires many years of practice to develop the sensitivity to enable the practitioner to read pulses with accuracy (Hsu, 1999).

3.1 Method

Each wrist has three positions where the practitioner's fingers are placed in order to palpate the pulse and this makes a total of six positions of palpation altogether (refer to Figure

1). From each position on the wrist, the practitioner registers at least two levels from which the pulse waveform qualities can be felt and are referred to as 'superficial' and 'deep'. These levels are also associated with specific organs and networks (refer to Figure 2 and Figure 3). For the purposes of differentiating the traditional Chinese conception of the organs from those of occidental medicine, Chinese 'organs' are capitalised in this text and are not to be confused with the western biomedical understanding of these organs. Each of the organs and networks (known as *zàng-fǔ*)¹² are also associated with an element, colour, tone, etc., which is further discussed in section 3.3 below (Lewis-King, 2013).

Figure 1. Pulse Raeding: Cambridge 1 (2014). Source: Léna Lewis-King. © Michelle Lewis-King.

3.2 Performance, Procedure and Recruitment

The performance itself is staged in a public space using simple props such as a table, chair, notepaper, ink, brushes, acetate, a laptop and a white coat. Participants' pulses are individually recorded and interpreted. The collection of data is modeled on a medical history or 'case-study' basis. Clinical impressions of participants' pulses are first notated with clinical descriptions, e.g., 'bowstring', 'slippery', 'replete', and so on (refer to Figure 4). The qualities of the pulse such as speed, vibratory sensations, fullness, emptiness, etc., are also recorded and form part of the hand drawn graphic notations (see Figure 5). The drawn lines in the graphic notations mainly describe the oscillations of the *zàng-fǔ* organ-networks or channels (see section 3.3 for a full

description of Chinese medicine theory). The graphic and clinical notations are then used as a reference for creating unique soundscapes for each participant using the open source software *SuperCollider* (SC).¹³ Each participant is given their individualised graphic notation during the performance and a SC soundscape file composed uniquely for them is also sent to them post-event via email. The notations and compositions of each participant constitute individual samples of the overall research project that is archived online on *soundcloud* and a collection of pulse soundscapes has also been released as a digital EP on the experimental music label *Clang* (Lewis-King, 2013). Three sample 'pulse' soundscapes can be listened to in the supplementary section of this article as well as on *soundcloud* or via the *Clang* label.¹⁴

3.3 Basic Chinese Medicine Theory and SuperCollider Soundscapes

According to early Chinese philosophical thought, all phenomenal processes are organised into an erotic interchange between *yīn* and *yáng*.¹⁵ The interplay of *yīn* and *yáng* forces are in turn affected and shaped by the interrelated movements of *wǔ xíng*¹⁶ or the 'five elements and seasons': Earth, Fire, Metal, Wood and Water (Kaptchuk, 2010). The Chinese observed these processes to be animate within all forms of being-in-nature (including animals) as a cosmological process (Imrie et al, 2005).

The theories of *yīn yáng wǔ xíng* are also fundamental to the theory and practice of Chinese medicine therefore this paragraph serves to convey a basic outline of Chinese medicine theory in terms of how it describes the overall systems and substances that comprise the body. There are five *zàng*¹⁷ organs that are *yīn* in nature: the Heart (including the "Pericardium"), Spleen, Lungs, Kidneys and Liver; and six *fǔ*¹⁸ organs that are *yáng* in nature: Small Intestine, Large Intestine, Gall Bladder, Urinary Bladder, Stomach and Triple Heater. The *yīn zàng* and *yáng fǔ* organ networks correspond with each other and are paired together to form what is referred to as *zàng-fǔ* paired networks, i.e., the *yīn* Spleen network corresponds with the *yáng*

Figure 2: Pulse reading positions (2013). Source: © Michelle Lewis-King.

Stomach network to form a *yīn yáng zàng-fǔ* paired network. Each of the *zàng* and *fǔ* organs possess an associated energetic network or 'channel' that runs between the depths of the organ to the outer reaches of the body (Unschuld, 1986, 408). There are six *zàng-fǔ* organ-network pairs – a total of twelve energetic networks (or channels) when including the *yīn* Pericardium organ. These twelve channels form the fundamental structural basis for my graphic notations and SC compositions (Lewis-King, 2013).

Each *zàng-fǔ* pair are also each associated with one of the following five elements: Fire, Earth, Metal, Water and Wood i.e., Stomach/Spleen = Earth, Lung/Large Intestine = Metal, Kidney/Bladder, Water, Liver/Gall Bladder = Wood, Heart/Small Intestine = Fire, Triple Heater/Pericardium = 'Ministerial' Fire. The *zàng-fǔ* pairs are also associated with fundamental colours: Fire = Red, Earth = Yellow, Metal = Silver/White, Water = Indigo/Black, Wood = Green. (Unschuld, 1986, 256) Each element also has a fundamental musical tone associated with the traditional Chinese pentatonic scale, i.e., *gōng*, *shāng*, *jué*, *zhǐ*, *yǔ*. The frequencies I use in SC are

Figure 3. Nan-Jing pulse diagram (2013). Source: © Michelle Lewis-King.

calculated using traditional pentatonic tones (Cheng-Yih, 1996, 44-48; Lewis-King, 2013).¹⁹

Instead of using SC to create logical musical arguments (as is standard), my use of SC

programming language intensifies its focus on *listening* as the basis for composing each landscape – adjusting the sine wave shapes and

Figure 4. Clinical notations 1 (2011). Source: Barbara Butkus. © Michelle Lewis-King.

Figure 5: Graphic notation: Cambridge 1 (2014). Source: Léna Lewis-King. © Michelle Lewis-King.

functions within each programming command by 'ear' in order to create sounds that match the fluid and electric-like nature of the vibrations I feel within people's pulses. Clinical notes, drawings and graphic notations generated from the performance are used to compose each SC command line so that the vibratory qualities of the drawn lines associated with each pulse position can be rendered as faithfully as possible (Lewis-King, 2013).

In order to faithfully convey the landscape of the body according to Chinese Medicine pulse diagnostics, each sine wave is carefully modulated to exemplify the signature qualities of pulse waveforms as described in the notations (Refer to Figure 6). For example, the command `{SinOsc.ar(262.dup, mul: LFNoise2.kr(4, 3).max(0) * 0.009)}.play;` corresponds to an aspect of a pulse emitting a 'fine, slow, and irregular' oscillation along the 'Spleen' channel. The *gōng* tone at the frequency of 262 Hz corresponds to the Spleen and Stomach networks and is therapeutic for these 'Earth' networks according to Chinese medicine theory (Gao et al, 2010; Lewis-King, 2013).

4 Discussion: Rethinking Digitality Through the Human Technology of Touch

This section serves to provide a conceptual framework for situating my sound practice within a contemporary context of digital creative practice as well as to reconsider the body in relation to digitality.

As Katherine Hayles wrote over twenty years ago but is even more relevant now:

If my nightmare is a culture inhabited by posthumans who regard their bodies as fashion accessories, rather than the ground of being, my dream is a version of posthuman that embraces the possibilities of information technologies without being seduced by fantasies of unlimited power and disembodied immortality, that recognizes and celebrates finitude as a condition of human being, and that understands that human life is embedded in the material world of great complexity, one on which we depend upon for our continued survival (1999, 5).

From the automata of Descartes to the Turing test and Warren McCulloch's and Walter Pitt's computational theory of the mind and brain to

fact that humans as 'users' have a reduced position in relation to the computer because users are placed within the 'position of command and use, rather than to the position of interpretation,

Figure 6. Sample of SuperCollider V&A composition (2013). Source: © Michelle Lewis-King.

the decoding of the DNA code, by and large, in terms of digitality as the expression of zeros, ones and vectors (Mäkelä, 2001), the human body continues to be characterised as a (passive) pattern of information (Hayles, 1999). As Tapio Mäkelä asks in his essay, *Re-reading digitality through scientific discourses of cybernetics: Fantasies of disembodied users and embodied computers* (2001), Mäkelä wonders why are computers are continually regarded as vehicles of 'communication' instead of calculation – which he reminds us is essentially what computers are. Mäkelä asserts that there seems to be a fundamental misunderstanding and a lack of critique surrounding the anthropomorphizing of computers within the discourse of new media, computer science, etc. Mäkelä also reflects in the

intuition and experience' (2001, 152). In other words, within cybernetics and computer science, particularly where it concerns the research, development and design of human computer interfaces, there is an undue determination to emulate and analyze human functions and behaviour. Additionally, to the inclusion of the other within computational processes prioritizes logical structure and command functions over incorporating or working in tandem with the 'users' (human) ability to intuit and interpret from within grounded experience. This embodied form of human creativity (to intuit and interpret) is disabled and switched off during the planning and developmental stages of the majority of digital technologies. In this way, calculation and command as forms of creative communication continues to determine and dominate human-

'users' (human) ability to intuit and interpret from within grounded experience. This embodied form of human creativity (to intuit and interpret) is disabled and switched off during the planning and developmental stages of the majority of digital technologies. In this way, calculation and command as forms of creative communication continues to determine and dominate human-computer interaction within the arts and sciences.

What distinguishes *Pulse Project* from the preponderance of creative projects that use digital technology to represent the body and (human) body-computer interactivity (including two-person/interpersonal games and game design) is that the methods of my research and composition processes themselves include intuition, interpretation and translation as an *active* (rather than passive) part of the work. The notations and soundscapes evidence (both visually and sonically) the translative and performative processes between: the body and the digital, between Western and Asian constructions of bodily terrain, and, between using the language of industry to represent bodily process and the use of touch as an embodied 'digital' technology. My use of touch and creative interpretation (rather than using computation and digital technology to represent the body) offers a methodology that connects, interprets and translates the intimate, intuitive and embodied encounter of entanglement between our selves and other selves that the grid of digital technology cannot capture (why should it?).

Susan Kozel, Professor of New Media at Malmö University, similarly addresses our over-reliance on machines to represent phenomenal experience in her book, *Closer: Performance, Technologies, Phenomenology* (2007). Kozel writes:

This willingness in Cytowic's words (as cited in Kozel, 2007, 11), "to accept the judgement of the machine" approaches a distorted version of what Merleau-Ponty calls perceptual faith, distorted because instead of faith being based in the thickness of our own sensory experience, it is transposed onto the results of computational processes and the

assumptions behind the algorithms that control them. (11)

In addition to becoming more critical of the tendency to rely on machines as the golden standard for representing phenomena, artist and philosopher Erin Manning argues in *The Politics of Touch* (2006), that we should also strongly critique the 'sensing mechanisms that drive the body and force it out of the grids of intelligibility that would like to capture it for the service to the national body-politic and its measures of quantification' (2006, xv). Here, Manning questions the epistemic approach within digital representation of live embodiment (grids, vectors, zeros and ones, etc.), as a the (colonial?) formation of a social and national body politic that seeks to subjugate the complexity of embodied being to the 'stultifying narratives of the nation state' where the self/body is quantified within a logical 'linear space-time' (xvi).

In order to preserve creative and 'democratic' agency within digital cultures, Manning asserts that we need to interweave cultural narratives of embodiment as well as focus more on qualitative and relational aspects of phenomenal embodied experience over the current over-reliance on the controls of quantitative and linear methods to construct fixed, mapped, generalisable and homogenous 'realities'. Instead, Manning wants us to 'think of the body as excessive to the national body-politic' (xvi). *Pulse Project* works within the terrain of these points raised by Manning and Kozel as points of reference and of departure. In using 'forgotten' technologies that include intimate touch and the production of other bodies and interpretations themselves as a source for knowledge creation (techne), *Pulse Project* offers a critical reconsideration of the relationships between self, culture and technology.

4.1 Techne and Touch

Pulse Project explores touch in relation to (knowledge creation) techne through performance, and in so doing, enacts a hybridity of the technical and poetic from an inverse position, by placing its emphasis on the human technology of touch as the central 'tool' that affords the realization of the performance and

artworks and as a sensual tool that is able to discern, shape, affect and build knowledge through the embodied experience. Touch offers a means of producing knowledge that cannot be easily separated out into tidy categories of 'higher' and 'lower' and this forces us to reconsider how we produce and conceptualise knowledge. For instance, if *techne* can be understood as a 'creative' activity that brings things into being (i.e., *techne* as a means for reaching a particular result) and 'poesis' can be understood to be the revelation of a truth or truths (Heikkilä, 2008), then *Pulse Project* uses touch to bring an accord between poesis and praxis by applying touch from a different philosophical and practical approach than Greek/Judeo-Christian conventions for touch, intimacy and apprehending knowledge of the body, etc. In introducing a system of knowledge that 'differs' from western knowledge systems, particularly the Cartesian system that articulates the division between the higher functions of cognitive thought from the lower functions of embodied activity (Vaccari, 2012), this 'other' system of knowledge enables what is considered to be 'true' and the technique of how things are brought into being in one context to become radically altered in another (Derrida, 2005).

This project does not simply argue for a uniting of poesis and praxis through constructing a logical (cognitive) argument, but instead makes its case through utilising the 'tool' of human touch within a performance context as an affordance that enables the embodied being of practitioner and participant to be brought into intimate proximity with one another. Touch is also used in *Pulse Project* to bring different cultures, e.g., art, medicine, technology, Asian and Occidental practices, etc., into proximity with one another to create 'new' creative dialect. *Pulse Project* doesn't reveal a 'truth' nor simply point out the technical means of how a truth or product is brought into being, e.g., the description of a methodology. Instead, *Pulse Project* 'touches' upon and brings into being the presences of what cannot be firmly placed into the fixed logical frames of visual representation. In Jean-Luc Nancy's body of writing on touch and *techne* (as the creation of art), Nancy writes on the slippage between *techne* and poesis when

the technique itself is touch. Touch as a technique touches its own limits (in the context of this study) in that it places the actor who is 'touching' and the actor 'being touched' beyond their own distinct boundaries and this places them outside themselves towards the infinite (Nancy, 2008; Derrida, 2005; Heikkilä, 2008). Touch as a technique encapsulates the erotic continuum between what is outside of ones' touch and what can be brought into being through the proximity of touch. *Pulse Project* produces creative works that exist simultaneously both inside and outside of knowledge – are formed by the formless (Nancy 2008). By simultaneously using touch as a technique to dissolve the distinct boundaries between self, other, culture and cosmos influences (e.g., *yinyang wuxing*), *Pulse Project* brings into being that which cannot be fully known, explained or contextualised. The public performances, notations, drawings, algorithmic compositions and sound installations of *Pulse Project* all materialise (through the affordance of touch) the multiplicity of creative possibilities that exist within the matrixial embodied spaces between human bodies, bodies of knowledge, cultural bodies and the infinite (Nancy, 2008; Ettinger, 2005).

5. Conclusions

This study brings together the diverse practices of art and science through the medium of sound by using Chinese pulse diagnostics together with performance and algorithmic programming to critique and widen the notion of the clinical encounter. The audio works of this study do not attempt nor claim to be a straight representation of the inside of the body from within the Cartesian logic of the 'cogito' (Lefebvre, 2004, 16) but uses Chinese medical and philosophical approaches to widen theoretical and practical discourse surrounding the ecology of embodiment. In resisting the representation of sound in 'realistic' technoscientific terms, this study also explores whether the fabrications of conceptual soundscapes of the phenomenal and metaphysical interior and in-between spaces of the body capture a deeper reality than those

represented by technoscience or those acoustic ecologies which deny the co-presence of the infrasonic ecology of the interior of the body with exterior sonic ecologies.

Pulse Project also explores a new approach to creating digital soundscapes by using Chinese pulse diagnostics as a unique source for creating an ecological relationship between art, science and technology. My methodological approach to composing aims to give visual, aural, textual and contextual form to the formless, intersubjective and temporal experience of the in that I compose algorithmic texts from within the rubrics of *yinyang wuxing*. The use of *yinyang wuxing* provides an alternative measure of embodiment to that of the fixed gaze of Western medicine that places the body within a fixed and static visual grid.²⁰ The concepts of *yinyang wuxing* enable Chinese physicians (past and present) to approach the body as a living entity within an ever-unfolding inter-relational space-time. In reading pulses, writing notations and then translating these sources of information into an audio programming language, this process in itself describes a touching, listening, reading and writing on sound in its embodied and 'live' situation.

As argued in section 2, *Pulse Project* uses the affordances of performance and digital soundscapes to resituate the western clinical encounter outside of its normative milieu in order to rethink the relationship between practitioner and participant (patient) as well as the relationship between art and science practice, and through doing so, generates a new digital ecology of embodied soundworks. In this way, this study seeks to provide a new means for producing and understanding sound relative to inter-personal embodied experience and offers an examination of the unique means with which sonic research can form a translation and synthesis of different disciplines, e.g., medicine and art, eastern and western practices, etc. *Pulse Project* is also used as a relational tool, i.e., using touch as a method for *deep listening*²¹ and also as a method for creating sonic portraiture. *Pulse Project* introduces a new method for touching and transposing sound that uses ancient and pre-modern approaches to the body to reconsider contemporary practices. Through my sonic

portraiture, I attempt to convey my findings on "living" embodiment.

In utilizing touch as a translational tool and medium, I connect art, science and technology with the complexity of 'being-with-others' in unique ways. Rather than creating an ecology of sounds by placing emphasis on environmental soundscapes - or on the liminal relationship the body has with environmental landscapes, this study explores creating soundscapes from direct participation, entanglement and intersubjectivity through using the creation of intimacy between the artist and audience as a context for exploring an ecology of sound. This study creates a unique method for soundscape composition as each composition is inclusive of and responsive to the participants of the research as the soundscapes are made specifically for the participants of the study as bespoke artworks. In using a sensitising and insightful form of touch to connect with participants, this instantly builds a mutual trust and rapport that no technical "instrument" or high fidelity recording could produce. In this way, this study uses the methodology of Chinese pulse diagnosis as a tool to challenge and extend contemporary artistic, medical, social science and sonic studies discourses (Lewis-King, 2013).

Glossary

Processual - Defined online on Google Dictionary as: 'relating to or involving the study of processes rather than discrete events'.

Sclang - SuperCollider programming language which uses an object-oriented and functional language syntax similar to C programming language (Wilson et al. 2011).

Scsynth - SuperCollider synthesis server which supports multiple input and output channels and uses a "bus system" to match programming commands with sound objects (Wilson et al. 2011).

Wū xíng - Often called the 'five phases' or elements (Earth, Fire, Metal, Water and Wood), this term describes a systematisation of phenomena into five distinct movements or phases. These phenomena could describe the movement and characteristics of the changing

seasons of spring, summer and so on. These elements have a specific relationship and order in relation to each other. One element may generate or control another, i.e., winter generates spring, whereas autumn is in contrast to spring. These elemental phenomena could describe the phasic interaction between cosmological entities or between the organs of the body as the early Chinese saw them (Rochat de la Vallée, 2009).

Yīnyáng - Describes two opposing yet interdependent and interconnected primal forces that are characterised by such phenomena that are cyclical or on a spectrum, such as 'day and night', 'hot and cold', 'internal and external', etc. This continually shifting pair of opposites constitute the fundamental basis for early Chinese philosophy and science (Sivin, 1995).

Zàng-fǔ - *Zàng* refers to the five yīn organs of the body: Heart/Pericardium, Spleen, Liver, Lung, Kidney. *Fǔ* refers to the six yáng organs: Large Intestine, Small Intestine, Gall Bladder, Urinary Bladder, Stomach, Triple Burner. These *zàng-fǔ* each have an associated channel that extends the energy of the organs along points across the body. As simple definition of the functions of the *zàng-fǔ*: the five yīn organs are said to "store" and produce essential fluids, while the six yáng organs transform essences into production of movements/energy (Unschuld, 1986).

Supplementary Material Audio Files

Three sample 'pulse' soundscapes referred to in this article can be accessed on the Taylor & Francis website:

<http://dx.doi.org/10.1080/14626268.2015.998681>

Audio Object 1: *Melanie Copenhagen I* (2014) © Michelle Lewis-King. 1:46.

Audio Object 2: *Ed Copenhagen II* (2014) © Michelle Lewis-King. 1:37.

Audio Object 3: *Sandy V&A 7* (2014) © Michelle Lewis-King. 2:00.

Notes

¹ This concept aligns with Elisabeth Hsu's "Towards a science of touch, part I: Chinese pulse diagnostics in early modern Europe" (2000).

² *Techné* is defined as creating knowledge through embodied doing and making, as in the development of a craft or the creation of an artwork (see wikipedia).

³ Originally trained as a sculptor (1986 -1994), I began working with sound and sound installations when I studied for my MA in sculpture at Chelsea College of the Arts in 1994 and continued to exhibit my sound work until returning to university in 2002. Between 2002 - 2005, I studied biomedicine and Chinese Medicine: Acupuncture at the University of Westminster, receiving a BSc in Acupuncture in 2005 and continued my studies on Chinese Herbal Medicine and biochemistry 2008-2009. I also ran a full time clinical practice between 2005 - 2011 before undertaking my current PhD study.

⁴ Please refer to the Glossary at the end of Section 6 for a definition of this term.

⁵ My interest in the Other is aligned with Emmanuel Lévinas's assertion that the Other is of more importance than the self and that the alterity of the Other places upon us the duty of discovering (but never fully 'capturing') the Other. In the clinical encounter, of course interest in and discovery of the Other is a crucial and central practice. See Lévinas's *Otherwise than Being or Beyond Essence*.

⁶ Chinese medicine, very simply defined, examines the temporal relationships between living organisms, nature and cosmological influences and seeks for way, through deeply apprehending these interior/exterior, natural/cosmic relationships, to augment the well-being and longevity of living beings (particularly, but not exclusively, humans). Chinese medical concepts will be developed further in this article.

⁷ Out of the eighty plus people who have participated in 'Pulse Project' between 2011 -2014, only one person knew what Chinese medicine was and could share in some form of active exchange of knowledge about this medical system.

⁸ Artist, psychoanalyst and philosopher Bracha L. Ettinger has developed a theory of the matrixial gaze that challenges and counters the phallogocentrism of the object-subject gaze in Lacan. The matrixial gaze also challenges their notions of feminine 'difference' developed by philosophers Deleuze and Guattari. Ettinger resists the traps of (phallic) binary subject/object or mind/body relationships through focusing on concepts such as co-emergence, intersubjectivity-as-encounter. The matrixial gaze perceives and affects rather than probes and authorizes. Refer to Ettinger's book, *The Matrixial Borderspace* (2005) for more information.

⁹ Constraint is a term used James J. Gibson to define a 'property of relation', an object or system that specifies the way in which agents will relate (Greeno, 1993, 338).

¹⁰ Throughout the three years of my undertaking this study, the fact that all but one participant even knew what Chinese medicine was goes somewhat towards demonstrating the predominance of biomedical (mono)culture within British and European societies.

¹¹ I use the term 'Chinese medicine' here to signify a medical tradition and practice that spans from Early Chinese civilization (1000 B.C.E.) to contemporary practice of Chinese medicine across the world.

¹² Refer to the Glossary for a description of this term.

¹³ SuperCollider is defined in Wikipedia as a programming language and environment that enables users to create 'real

time' algorithmic compositions. SC uses an object-based language that is split into two components – a server (*scsynth*) and a client (*sclang*) that communicate through using an Open Sound Control object: 'Osc'. See: <http://en.wikipedia.org/wiki/SuperCollider> Please also refer to the Glossary for further definitions of *scsynth* and *sclang*.

14 To hear more audio samples of the project visit the link:

<https://soundcloud.com/cosmosonicsoma/sets> and

<http://clang.cl/pulse-landscapes-2/>

15 Refer to the Glossary for a brief explanation of these terms.

16 Refer to the Glossary for a brief explanation of this term.

17 See Glossary.

18 See Glossary.

19 For an explanation of the classical Chinese pentatonic scale and methods for tuning used in these compositions, please refer to:

http://en.wikipedia.org/wiki/Chinese_musicology

20 Refer to Albrecht Durer's woodcut, 'Draftsman Making a Perspective Drawing of a Reclining Woman' (1525). See MOMA's link:

<http://www.metmuseum.org/Collections/search-the-collections/366555>

21 American composer Pauline Oliveros is credited with coining the term in 1991 according to an interview conducted by Alan Baker for *American Public Media* in January 2003.

References

Baker, Alan. 2003. 'An Interview with Pauline Oliveros'. *American Public Media*. January. [online]. Available at http://musicmavericks.publicradio.org/features/interview_oliveros.html > [Accessed 15 August 2013].

Cheng-Yih, Chen. 1995. *Early Chinese Work in Natural Science: A Re-examination of the Physics of Motion, Acoustics, Astronomy and Scientific Thoughts*. Hong Kong: Hong Kong University Press.

Conquergood, Dwight. 1991. 'Rethinking ethnography: towards a critical cultural politics'. *Communication Monographs*, June, 56, pp. 179–94.

Derrida, Jaques. 2005. *On Touching, Jean-Luc Nancy*. Stanford: Stanford University Press.

Ettinger, Bracha. 2005. *The Matrixial Borderspace*. Minnesota: Minnesota University Press.

Gao, Dadi., Chen, Andy.G., Gao, YeTao., and Shi, Sanquan. 2010. 'The Five Organs Harmonise Pitch: Modern research and clinical treatment of the lost

theory and technology in *Huang Di Nei Jing*' *Journal of Accord Integrative Medicine*, 6(2): 75–92.

Greeno, James G. 1993. 'Gibson's Affordances'. *Psychological Review*. 101(2): 336–342.

Hayles, Katherine. 1999. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics*. Chicago: University of Chicago Press.

Heikkilä, Martta. 2008. *At the Limits of Presentation: Coming-into-presence and Its Aesthetic Relevance in Jean-Luc Nancy's Philosophy*. Bern, Switzerland: Peter Lang.

Hirose, Naoya. 2002. 'An ecological approach to embodiment and cognition'. *Cognitive Systems Research*. 3(3): 289–299.

Hsu, Elisabeth. 1999. *The Transmission of Chinese Medicine*. Cambridge: Cambridge University Press.

Hsu, Elisabeth. 2000. 'Towards a science of touch, part I: Chinese pulse diagnostics in early modern Europe.' *Anthropology & Medicine* 7(2): 251–268.

Imrie, R. H., Ramey, D. W., Buell, P. D., Ernst, E. and Basser, S. P. 2001. 'Veterinary acupuncture and historical scholarship: claims for the antiquity of acupuncture'. *The Scientific Review of Alternative Medicine*. 5, pp.133–9.

Jullien, François. (2004) *A treatise on efficacy : between Western and Chinese thinking*. Honolulu: University of Hawaii Press.

Kamtekar, Rachana. 2004. 'Situationism and Virtue Ethics on the Content of Our Character'. *Ethics*. April. 114(3), pp. 458–491.

Kaptchuk, Ted. 2010. *The Web That Has No Weaver: Understanding Chinese Medicine*. New York: RossettaBooks LLC.

Koski, Kaisu. 2011. "Art Portraying Medicine." *Journal of Research Practice* 7(1). [online]. Available at <http://irp.icaap.org/index.php/irp/article/view/259/235> > [Accessed 20 March 2013].

Kozel, Susan. 2007. *Closer: Performance, Technologies, Phenomenology (Leonardo Book Series)*. Cambridge, Massachusetts: MIT Press.

Lakoff, George and Johnson, Mark. 1999. *Philosophy in the Flesh: the Embodied Mind and its Challenge to Western Thought*. New York: Basic Books. <http://jrp.icaap.org/index.php/jrp/article/view/259/235>

Larson, Kay. 2013. *Where the Heart Beats: John Cage, Zen Buddhism and the Inner Life of Artists*. USA: Penguin Group Incorporated.

Lefebvre, Henri. 2004. *Rhythmanalysis: Space, Time and Everyday Life*. New York: Continuum.

Lévinas, Emmanuel. 1999. *Otherwise than Being or Beyond Essence (Autrement qu'être ou au-delà de l'essence)*. Translated from French by Alphonso Lingis. Pittsburgh: Duquesne University Press

Lewis-King, Michelle. 2013. 'Touching as Listening: Pulse Project'. *Journal of Sonic Studies*. 4(1). [online] May. Available at <<http://journal.sonicstudies.org/vol04/nr01/a12>> [Accessed 15 June 2014].

Lewis-King, Michelle. 2014. 'Pulse Project: a sonic investigation across body, culture and technology'. *Reflections on Processes in Sound*. 3. [online] Summer. Available at <http://issuu.com/ropis/docs/reflections_on_process3/0> [Accessed 10 October 2014].

Mäkelä, Tapio. 2001. 'Re-reading Digitality through Scientific Discourses of Cybernetics: Fantasies of Disembodied Users and Embodied Computers'. *Conference Proceedings for affective encounters: rethinking embodiment in feminist media studies*. Anu Koivunen and Susanna Paasonen eds. University of Turku, School of Art, Literature and Music, Media Studies, Series A, No. 49. 152-161.

Manning, Erin. 2006. *Politics of Touch: Sense, Movement, Sovereignty*. Minnesota: University of Minnesota Press.

Nancy, Jena-Luc. 2008. *Corpus*. Trans. Richard Rand. New York: Fordham University Press.

Rochat de la Vallee, Elisabeth. 2009. *Wu Xing*. Taos, New Mexico: Redwing Book Company.

Sivin, Nathan. 1995. *Science in Ancient China. Researches and Reflections*. Aldershot: Variorum.

Unschuld, Paul. 1986. *Nan-Ching: The Classic of Difficult Issues*. Berkeley: University of California

Press.

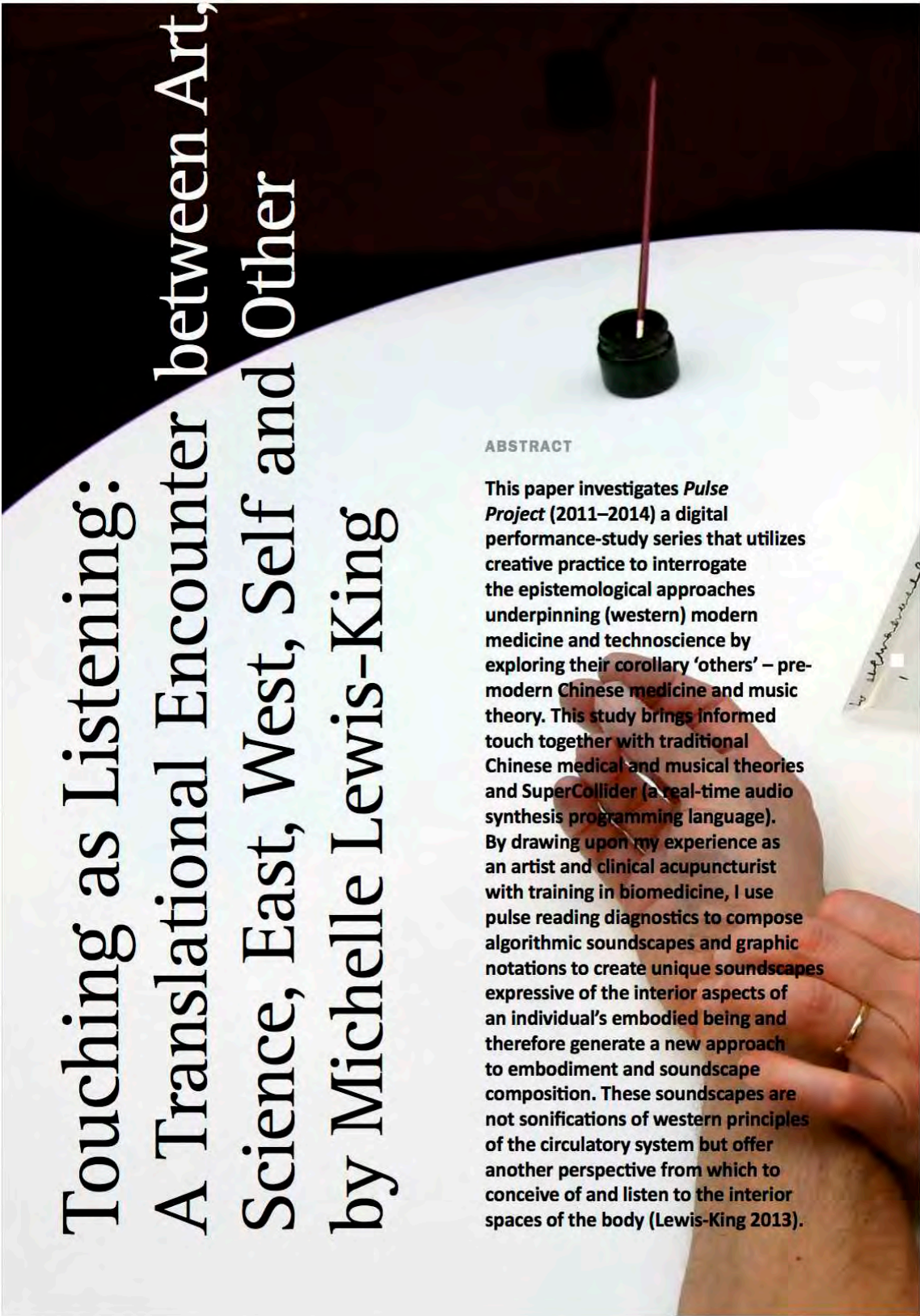
Vaccari, Andreas. 2012. "Dissolving Nature. How Descartes Made Us Posthuman." *Techné: Research in Philosophy and Technology* 16(2), pp.138-186.

Wilson, Scott., Cottle, David., Collins, Nick. 2011. *The SuperCollider Book*. Cambridge, Massachusetts: MIT Press.

Yu, Ning. 2003. 'Metaphor, Body and Culture: The Chinese Understanding of Gallbladder and Courage'. *Metaphor and Symbol*. 18(1), pp.13-31.

Zarcone, Thierry. 2003. 'China as Philosophical Tool' : François Jullien in Conversation with Thierry Zarcone." *Diogenes*. November. 50, pp.15-21.

Michelle Lewis-King is an artist-acupuncturist, lecturer and PhD research fellow for the Cultures of the Digital Economy Research Institute, Anglia Ruskin University, and her research investigates the cultural interfaces between art, medicine and technology. Michelle's artistic research explores the practice of Chinese medicine as a critical and performative intervention within the contexts of (Western) biomedical clinical praxis. Michelle's research has been published in the *Journal of Sonic Studies* and *ELSE Journal for Artistic Research*, and her work has also been recently exhibited at the V&A Museum, Ex- Teresa Museum (Mexico) and Spike Island.

A photograph of a hand holding a small, black, cylindrical pulse reader device over a white surface. A thin, red, vertical line extends upwards from the device. The background is dark and out of focus.

Touching as Listening: A Translational Encounter between Art, Science, East, West, Self and Other by Michelle Lewis-King

ABSTRACT

This paper investigates *Pulse Project* (2011–2014) a digital performance-study series that utilizes creative practice to interrogate the epistemological approaches underpinning (western) modern medicine and technoscience by exploring their corollary ‘others’ – pre-modern Chinese medicine and music theory. This study brings informed touch together with traditional Chinese medical and musical theories and SuperCollider (a real-time audio synthesis programming language). By drawing upon my experience as an artist and clinical acupuncturist with training in biomedicine, I use pulse reading diagnostics to compose algorithmic soundscapes and graphic notations to create unique soundscapes expressive of the interior aspects of an individual’s embodied being and therefore generate a new approach to embodiment and soundscape composition. These soundscapes are not sonifications of western principles of the circulatory system but offer another perspective from which to conceive of and listen to the interior spaces of the body (Lewis-King 2013).

1. INTRODUCTION

Pulse Project is a transdisciplinary and transcultural research project that uses pulse reading as a translational *medium* – as an instrument of convergence between art and medicine, east and west, past and present, self and other. Each participant's pulse is interpreted as a unique set of sound-wave images based on the theories of traditional Chinese pulse diagnostics (a complex set of 28+ waveform images corresponding to metaphysical/ physical states of being) and also in accordance with traditional Chinese music theory as a means for exploring and making a sonic record of the intersubjective space/time between self and others. These soundscapes are not interpretative of the western notion of the circulatory system, but instead draw on Chinese medical and music philosophy in order to represent the body as a living cosmos pulsating with matter and energy.

In order to determine the ways in which *Pulse Project* offers a new approach to transdisciplinary practice, I first outline a contemporary relationship between art and science and some associated problematics of this relationship in section 2. In section 3, I discuss the problem of creating an equitable ecology of practices between science and its 'others' (Stengers 2010) and suggest that transdisciplinary practice is the best way to bridge the 'cultural divide' between art and science (whilst also situating my own creative practice in relation to this approach). In section 4, I discuss personal experience as a transdisciplinary practitioner (engaged in both arts and science practices). These experiences are explored within *Pulse Project* and its use of performance to restage the western clinical encounter outside of its normative milieu in order to translate the alchemical functions and actions from one code of practice (medicine) to another (art) and back again. In section 5, I outline *Pulse Project* and present sample audio files of the SuperCollider (SC) soundscapes generated from the study. In section 6, I conclude with making the case for why *Pulse Project* offers a unique approach to transdisciplinary practice.

2. ART AND SCIENCE TRANSDISCIPLINARY PRACTICE: A TRULY NEW APPROACH TO AN OLD PROBLEM?

That growing collaboration between the fields of art and science is a major contemporary trend is undeniable. Even mainstream magazines such as *Time* have featured articles discussing this trend.¹ Though

the actual diversity of collaborative practice between art and science is too varied to discuss in real terms, existing as they do on a spectrum that ranges from works which approach the arts from a mainly science-based perspective² to works placing scientific research within the contexts of arts-based research.³ Given the extraordinary interest in art and science collaboration taking place globally⁴, new projects and theories are continually materializing; therefore this discussion does not attempt to form a position of expertise on their cultural relationship but limits itself to the concerns that have arisen from my own professional experience as an artist and healthcare practitioner in relation to creative practice.

While there can be no doubt that disciplinary collaboration between art and science can provide incredibly rich sources for the production of new forms of knowledge for both disciplines, investigating a little deeper beneath the initial enthusiasms of this 'new' alliance reveals a tendency for certain older patterns to be repeated. The identification of patterns in this article will focus mainly on the power dynamics that operate between art and science in cultural milieus, the manner in which this dynamic functioned historically and how this history still shapes art science collaboration today.

That institutions such as the Wellcome Trust and its new associate the 'Science Gallery' place their emphasis on using art as a source of public engagement is a fundamental problematic explored in this article.⁵ Speaking about the assumptions behind this recent development (of using the arts to visualize science and technology) in her recent lecture at the London School of Economics, *Art for the Sake of Science: Artistic Visualization as 'Critique'* (2013), philosopher of science Chiara Ambrosio calls attention to the fact that 'collaboration between artists and scientists still nowadays seems to involve the assumption of a sharp separation of these two fields: art belongs to the realm of creative inspiration, while science is about data, evidence and testability...I want to challenge this division, and in particular I want to question the idea that the role of art in art-science collaborations consists exclusively of "illustrating" scientific concepts' (Ambrosio 2013).

1. See discussion on this theme in 'Buzzwords: "Art Science" Is the Newest Artworld Trend', *Time*, June 1st, 2012 or 'Small Worlds: Science Meets Art Under the Lens', *Scientific American Magazine*, December, 2012 issue to name but two in the sea of recent articles on this subject.

2. For an example of this approach to aesthetics see the article, 'An Efficient Algorithm for Determining an Aesthetic Shape Connecting Unorganized 2D Points' in *Computer Graphics Forum* by S. Ohnhalinger and S. Mudur.

3. For an example, see, 'Media Study: Robert Irwin' in *Artforum's 50th Anniversary issue: Arts New Media*, (September 2012) for a Irwin's discussion on how his intervention into various spaces, the creation of sensory deprivation chambers, etc. transformed NASA's researchers approach to their research of conditions of living for a significant period in space.

4. See 'Science Art' project at Moscow State University which addresses science-art as a global phenomenon: <http://www.science-art.ru/en.php>.

5. Though the 'Science Gallery' say they support the areas where art and science collide, it is clear in their mission objectives that their main focus is on using art for public engagement of science, see: <https://sciencegallery.com/international>. Also, their board of directors is almost exclusively comprised of scientists, venture capitalists and technologists with a very low number of artists to inform curatorial and other important decisions. View their governance board: <https://sciencegallery.com/governanceboard/> and their Leonardo Group: <https://sciencegallery.com/leonardo>.

Is there really a danger that science is simply not engaged enough in culture?

So why is that we need more and more artists to disseminate the concepts and practices of science? Is there really a danger that science is simply not engaged enough in culture? Sian Ede, Arts Director of the Gulbenkian Foundation and author of *Art and Science* (2005), also identifies this issue as a cause for concern when she writes, 'Contrary to the claims of some in the science community, the public is better informed about contemporary science than it is about contemporary art. Scarcely a news bulletin passes which does not contain the words, "scientists have discovered that..."' (Ede 2005: 1). Ede argues that the contributions art makes to society is as vital to our existence as those contributions made by the sciences and that the range of diverse viewpoints and creative thought processes the arts offer to science are just as crucial to creating an understanding of our evolution. Ede argues that we live in a time where scientific exploration and explication is in the ascendant and that a 'new universalist belief system' regarding the evolution of the mind that is currently being promoted by the new sciences poses the risk of de-personalizing human experience, especially as the uniqueness of human individuality is increasingly mediated and replaced by mechanical processes (3).

The assumption that art can be used as a medium to disseminate the content of scientific research assumes a subjugation and passivity of artistic practice to the more important business of disseminating scientific knowledge. This stance (and the problems that attend it) finds its roots in an ongoing cultural battle between rationalist forms discourse and its Othered forms of knowledge production. The two most recent historic examples are the science wars of the 1990's and C.P. Snow's *Two Cultures* debate of the 1950's. Put simply, the science wars were a series of heated discussions that occurred at symposia and in academic journals between 'scientists and the social scientists who study them' (Beringer 2001: 2). The 'wars' started shortly after the authority of the scientific method and its capacity to produce certainties/truths were called into question by social scientists using postmodern and constructivist theories. The scientific rationalists who saw themselves as 'representing' science, i.e., Alan Sokal, Steve Fuller, Lewis Wolpert, etc. and social scientists representative of the academic left became embroiled in heated debates that sometimes became poisonous.⁶ These 'discussions' find their echoes in

an earlier disputation ignited by C.P. Snow's Rede Lecture in 1959 titled 'Two Cultures'. Snow's lecture elaborated on the idea that the whole of western civilization is bifurcated into two opposing camps, namely science and humanities. Snow called attention to what he saw as the irreconcilable differences that existed between them, and with slight hostility, placed the agenda of science as superior to that of the humanities and bemoaned that the humanities dominated British society (1959) to which the literary critic F.R. Leavis answered by mocking Snow in a petty, snobbish manner in his response (Ede 2005: 5; Halpern 2012: 923).

The cultural divide between the arts and sciences is further compounded by their opposing methodological practices and investigations into knowledge production (Ede 2005; Eisner 1981). In her recent ethnographic study on art and science collaboration, 'Across the *great divide*: Boundaries and boundary objects in art and science' (2011), Megan Halpern examines the methods of collaboration between artists and scientists by first providing a historical and theoretical context for her study which she identifies as defined by the 'two cultures' debate'. Halpern points out that this binary categorisation of the 'two cultures' has been mapped and re-mapped over time into 'arts and sciences', 'science and humanities', 'natural and social science', 'sciences and everything else', and writes that,

'These re-mappings point to an entanglement between the art/science and science/public relationship that neither scholars nor scientists have yet been able to tease apart. This entanglement suggests that no matter what we profess to know about science communication, the role of science, and of scientists, is still held conceptually apart from, and in many cases above, other forms of knowledge production, including the arts. In spite of efforts to integrate the arts and sciences, and in spite of efforts to transform the way science is communicated to the public, these boundaries have persisted (923).

Halpern examined collaborative practice between artists and scientists by analyzing the boundaries and boundary objects artists and scientists shared in order to realise their work, i.e., boundary objects such as drawing, writing, discussion, and debate

⁶ See Ullica Segerstrale's discussion in 'Science and Science Studies: Enemies or Allies? In *Beyond the Science Wars: The Missing Discourse about Science and Society* (2000), where she gives a personal account of attending the conference where scientists unfairly questioned feminist academic Donna Haraway (who was the only representative of the postmodern side of the debate) about her own and other feminist critics' scientific training. See page 7.

⁷ In the Introduction to her book, *Art and Science* Sian Ede also mentions the 'two cultures' debate as a defining event in the cultural relationship between art and science.

used to mutually explore a set of ideas. Among many of Halpern's findings was that artists and scientists still need to defend what they perceive to be their respective professional boundaries; and that these boundary distinctions create, on the one hand, a sense of professional security and social value, and, on the other, hegemonic dynamics within the collaborations. Here, Halpern discusses the boundary distinctions that occur within the collaborative relationship between two scientists (Itai and Holly) and the respective artists they worked with:

'Itai identified the relationship between science and nature by drawing a distinction between science and other production. Holly identified protocols of knowledge production that are unique to science. Though these were very different conversations, both cases incorporated ways of re-establishing science's authority and protecting its autonomy. The artists paired with the scientists seemed fairly familiar or comfortable with the boundaries established by the scientists, and did not directly challenge them. This may be because the boundaries within scientific research are more well established than those of the art world, and thus, more recognizable to those outside the field' (929).

I use Halpern's study in this article to outline some of the problematics that underpin current interdisciplinary art and science practice, i.e., the collaborative practice between two separate disciplines, that this research project attempts to address through a transdisciplinary approach to creative practice. In order for the arts and sciences to be truly more collaborative, I argue that artists need to engage with and understand in far more depth the processes and restrictions that characterise the fields of science with which they are working. Likewise, scientists must learn from artists about artistic methods in order to engage with the social imaginary. Without artists and scientists making significant incursions into each other's disciplines, art science collaborations will only repeat the refrain of the divided 'two cultures'.

3. CREATING INROADS AND NETWORKS TO BRIDGE ART AND SCIENCE

'A Navajo sand-painting ritual for a sick child is a mystery – we literally cannot read the signs nor subscribe to the belief, let alone the science, that she can be made better this way. Are we to dismiss this cultural practice? This is shaky ground and what appears to be dogged cultural relativism infuriates scientists. Unfortunately, their own track record isn't

too persuasive. Who can say what is 'natural' for women at the beginning of the twenty-first century when scientific expert got it so wrong at the beginning of the twentieth? Even when we greatly respect their methodologies, it is always important to take cultural context into account'. (Ede 2005: 7)

How can an ecology of equitable practice be brought between the two often-opposing practices of art and science? Ostensibly, artists are not responsible for providing a set of findings/carrying out a set of interventions that empirically improve or save the lives of others. Likewise, scientists may not have the freedom to explore the diversity of thought processes and ethical queries that artists continually explore and feed back into social discourse. Philosopher and historian of science Isabelle Stengers has written extensively on this dilemma of translation and achieving accord between the sciences and other communities in *Cosmopolitics I & II* (2010), a series of seven texts that form a critical engagement with the science wars and offer radical strategies for reconciling their inherent conflicts by examining the basis on which these conflicts are epistemologically grounded. Stengers arrives at the centre of the conflict between science and its others by examining the ontological premises for the creation of certain criteria that the sciences and other communities employ to ensure their validity. Using the term obligations (55), Stengers describes these criteria as constraints, 'responsibilities' and 'rights' – as entities that are internally agreed upon and enacted within each particular community, an activity which confers upon that group a worth or validity as well as an authorial license to intervene on behalf of another individual or community.

But what of science's Others? What of the participants being acted upon? It is at this juncture where Stengers' critique unravels the coherence of scientific criteria and its obligations through revealing their limitations:

'The term "obligation" also reflects a principle of nonequivalence, but this time one that affects the "typical behaviors" or ways of proceeding of the practitioner herself, or the difference between that which, in her own practice and that of her colleagues, will excite, satisfy, disappoint, or be rejected as unacceptable. Obligation refers to the fact that a practice imposes upon its *participants* certain risks and challenges that create the value of their activity' (Stengers 2010: 55).

In this way, Stengers asks us to slow down our incessant 'mobilisation' towards assembling 'coherences' and taking actions so as to provoke divergent thinking and a deeper awareness of the complexity of a situation (2010). Stengers wishes for us reconsider the rationales

and directions of scientific intervention and accord and calls upon communities (scientific communities in particular) to open themselves up to those for whom they are acting on behalf of. She specifically asks for (scientific) communities to make their decisions more inclusive and equal to the diverse requirements of communities outside their remit. Stengers asks science to embrace the inherent creativity of working together with other communities by creating at the very least an interactive bidirectional methodology – instead of simply adhering to singular protocols that act in one direction, i.e., the practitioner via their knowledge tradition acting onto/ on behalf of the ‘patient’ (55).

It is at the site where practices are open to individuals and other communities that my project takes place, at the epicenter of the encounter between art and science. For me, creative practice is a testing ground for embodying the complexities of the temporal world — an open space for rethinking history, society,

make it possible to provide a new commentary in order to produce the kinds of contributions that are central to contemporary transdisciplinary praxis. This is not a unique strategy; after all, John Cage used Zen Buddhism to inform his approach on making compositions (Larson 2013). Along similar lines, philosopher Francois Jullien asks to ‘what extent’ as a civilisation have we ever been able to disembark from the ‘European schema’ we have inherited in order to think outside the perpetual reification of thought processes that stretch back to early Greek civilisation. Jullien states that these schematic processes are so deeply embedded in our thinking that we no longer see the foundations for such schema, but use them continually to construct cultural goals and then go about fulfilling them as if they were a matter of fact (Jullien, 2004: 1). To exit this endgame, Jullien asserts that he uses his scholarship of early Chinese thought as philosophical tool. Here Jullien remarks during an interview that he studies Chinese philosophy to:

The ‘wars’ started shortly after the authority of the scientific method and its capacity to produce certainties/truths were called into question by social scientists using postmodern and constructivist theories.

human, nature and technology. Instead of existing as passive commentators on the actions of science, what if art could be decoupled from its normative market and institutions and could instead intervene into the territories normally occupied by science — where matters of life and death occur (with all the ethical problems that creates)? What could science become if it embraced the complexity and plurality of (artistic) creativity and ceased excluding phenomena for the sake of establishing a generality as the means for determining ‘truth’? These are some of the questions I address in my research series, *Pulse Project*, through my examination of the clinical encounter and my attempt to extend the outcomes of ‘standard’ diagnosis towards more creative possibilities.

4. DISCUSSION: CREATIVE PRACTICE AS CULTURAL ALEMBIC

From the position that has been directed by the experiences and requirements of my own transdisciplinary practice, it became necessary to think laterally to the modern constructs of Western art and science themselves in order to gain an alternative perspective. To understand something from ‘other’ perspectives is to create a discourse, to

‘... get out of the Indo-European zone, notably the great Indo-European language, by breaking with its syntactic modes and etymological roots... Whereby China provides us with an exteriority which enables us to tackle European thought from the rear... to discover other modes of intelligibility... which does not mean that I presuppose them, and to conversely probe the prejudices of our reason’ (Zarcone 2003).

Whilst taking care to avoid ‘Orientalism’ and in a similar spirit to Jullien, I use my clinical practice of Chinese medicine within a western biomedical context as an object of inquiry and critique. By using my research and myself as the researcher as a *medium*, I use my role as a *scholar-physician-artist* (Scheid 2002) to situate my research at the junctures of self and other and science and humanities. This study inquires into the intersectional micro-worlds of embodied individuals and their encounters with external, social, natural and technical worlds.

As a practicing fine artist who undertook medical training and established a clinical practice,⁸ I subjected myself to the rigors of studying biology, anatomy,

⁸ I studied biomedicine and Chinese Medicine: Acupuncture between 2002–2005 and Chinese Herbal Medicine and biochemistry 2008–2009 and had a full time clinical practice between 2005–2010.

physiology, pathophysiology, differential diagnosis and evidence-based medicine research, obeying strict clinical protocols and ethical codes; whilst at the same time, I studied bodily process from the metaphysical approach of early Chinese medicine – where the body can be understood to be an assembled cosmological landscape, shaped and altered by continuous alchemical processes of *yinyang*⁹ *wuxing*.¹⁰ According to early Chinese philosophical thought, all phenomenal processes are organised into an erotic continuous interchange between *yin* and *yang*. The interplay of *yin* and *yang* forces are in turn affected and shaped by the interrelated and uninterrupted movements of *wuxing* (Kaptchuk 2010). For example, within the human body there are five *zang* (*yin*) organs: the Heart (including the “Pericardium”), Spleen, Lungs, Kidneys and Liver; and six *fu* (*yang*) organs: Small Intestine, Large Intestine, Gall Bladder, Urinary Bladder, Stomach and Triple Heater.¹¹ These organs have an associated energy reservoir or “network” that runs between the internal (*yin*) organs and the outer (*yang*) periphery of the body (Unschuld 1986: 408). The *zangfu* pairs are also each associated with *wuxing* – or the five elements: Fire, Earth, Metal, Water and Wood. For example, the Stomach/Spleen is associated with Earth, the Lung/Large Intestine with Metal, the Kidney/Bladder with Water, the Liver/Gall Bladder with Wood, the Heart/Small Intestine with Fire and the Triple Heater/ Pericardium with “Ministerial” Fire (Unschuld 1986: 256; Lewis-King 2013).¹² The Chinese observed these *yinyang wuxing* processes to be animate within all forms of being-in-nature – including animals – as a cosmological process (Imrie et al 2005).

This situation of practicing Chinese medicine within a Western biomedical clinic placed me in a unique position from which to look at the person/body from two cultural worldviews. One system privileges rational and transcendental action whilst the other privileges an embodied metaphoric action. According to Foucault, the ‘medical gaze’ within the modern clinic privileges sight over other senses and serves as a mechanism in which to objectify the other. In *The birth of the clinic* (1973), Foucault contends that within the sight/touch/hearing ‘sensorial triangulation’ of ‘anatomy-clinical perception’, its main emphasis “remains under the dominant sign of the visible” and that the diagnostic relationship is powered by the “triumph of the gaze that is represented by the autopsy: the ear and the hand are merely temporary” (Foucault 1973:165). Whereas Elisabeth Hsu writes in *Tactility and the Body in Early Chinese Medicine*

(2005), ‘If visual inspection of corpses was central to the development of anatomy in modern Europe, one may ask which of the senses was important for the emergence of the predominant currents of scholarly medical knowledge and practice in third- and second-century B.C.E. China?’ (2005: 7). Hsu argues that it was tactile perception prompted by a tactile exploration of living bodies (Lewis-King 2013).

It was these divergent approaches to the human body within my clinical education that enabled me to understand the body-in-being itself as an artistic medium for me. From the critical and expanded perspective of a contemporary art praxis, my participation in the clinic as a performance artist and ethical healthcare practitioner enabled me to approach the Other within the clinical encounter from an alternate creative dimension of thought. Working between biomedical and early Chinese medical principles, clinical practice became highly performative in all senses of the word – a crucible for experimental and intimate exploration into the indeterminate spaces between self and Other, of healing and transformation. The clinical encounter is co-performative act as it involves the interplay of at least two live actors (Conquergood 1991). From the position of an artist practicing science from within the dynamic space of the clinic, I began to understand the interior spaces of the other person within the clinical encounter as existing beyond the forensic site of the Cartesian autopsy. The self and Other became for me a site of live embodiment, alchemical transformation and ultimate creativity. This experience was informed by clinical experience from the perspective of Chinese medical practice, where the Other is not a separate entity from the self. Instead, an acupuncturist works with the life-force that exists between us on a micro-level as a healing medium.¹³

From these experiences, a central theme of my research has become the ‘artistic’ translation of the ‘scientific’ clinical encounter from the point of view of an arts practitioner who has experience from both within its structure as a ‘scientist’ as well as from outside this structure as an ‘artist’. Through practicing Chinese medicine, I question the notion of what science can be if not strictly tied to a western tradition. Indeed this question of what ‘science’ could be should also be asked from an inverse angle – through the consideration of the special situation which allows for the practice of ‘traditional’ Chinese Medicine (by a contemporary artist) within the contexts of biomedicine (Scheid 2002). In my research, I employ my clinical training within my creative practice as a

⁹ Refer to the Glossary for a brief explanation of these terms.

¹⁰ Refer to the Glossary for a brief explanation of this term.

¹¹ The organs as conceived of by Chinese Medicine are capitalised here to differentiate them from the same organs that we conventionally recognise within biomedicine.

¹² Also, there is no separation between the mind and body but they are understood to form one continuous – the bodymind. See Ted Kaptchuk’s *The Web That Has No Weaver* (2010).

¹³ In Chinese medicine, this is described as Qi. Please refer to the Glossary for a definition of this concept/term.

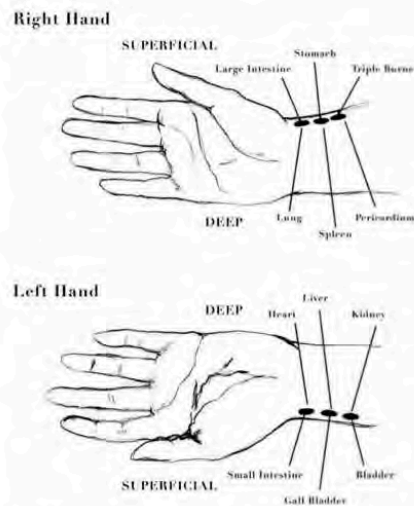


Figure 1: Chinese Pulse Positions (2013) © Michelle Lewis-King.

means of expanding the reach of arts and science praxis to extend beyond their normal confines and this study attempts to make unique inroads between them. In this way, I use my sonic study *Pulse Project* (my creative research which includes experience of a healthcare worker) to bridge art and science practices.

5. CASE STUDY: PULSE PROJECT

Pulse Project explores Chinese pulse diagnostics as a unique source for connecting art with science and for connecting performance with sound studies. This project investigates the use of intimate touch as a means for connecting with others and for producing embodied sounds that explore the intersubjective space/time between self and Other. Aligned with Isabelle Stengers' argument for the development of equitable ecologies of practice (practices that are inclusive of their relationships with the objects of their studies), this study addresses the notion that the participants in the research are of equal importance to the aims of research and the role of the researcher within the study (Koski 2011). This study also explores the sonic possibilities of the interior of the body when considered from a perspective alternative to standard practice in western medicine and technology.

In using pulse reading to touch upon the internal oscillations of others, touch is used as a method of intensive listening that enables me to translate the oscillations of subtle energies and flowing of blood within the interior universe of another into an

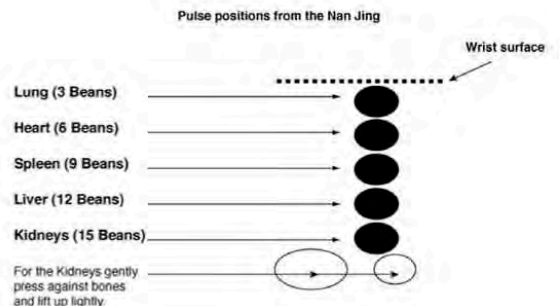


Figure 2: Nan Jing Pulse Classic Diagram (2013) © Michelle Lewis-King.

unique soundscape. The palpation of pulses requires many years of practice to develop the sensitivity and perceptual knowledge to enable the practitioner to read pulses with accuracy (Hsu 1999).¹⁴

Each wrist has three positions where the practitioner's fingers are placed to palpate the pulse, totalling six positions altogether (as demonstrated in Figure 1). From each position on the wrist (indicated by the dark circles) the practitioner registers at least two levels from which the pulse waveform qualities can be felt and that are referred to as "superficial" and "deep." These levels are also associated with organs and networks (see Figure 2). For the purposes of differentiating the traditional Chinese conception of the organs from those of occidental medicine, Chinese "organs" are capitalized in this text and are not to be confused with the western biomedical understanding of these organs (Lewis-King 2013).

In Figures 1 and 2 above, each of the black disks display the positions where pulse waveforms are palpated, interpreted and compiled together to produce an overall "portrait" unique to each participant.

There are multiple methods for pulse diagnosis in Chinese medicine. For example, according to sinologist Paul Unschuld's translation of the ancient text *Huang Di nei jing su wen* – a text that is attributed to having been formulated between 206 BCE and 220 CE (Unschuld et al 2011) – each pulse has a position and depth at which it is meant to be palpated (Adams 2006; Unschuld 1986: 117). For example, at one end of the spectrum, the Lung waveform is ideally palpable at the pressure level of three "beans" and at the other, the Kidney is ideally at the pressure level of fifteen "beans" (see Figure 2). If the wave-image arrives at

¹⁴ I began my training in 2002 and each pulse reading deepens my understanding.



Figure 3: Pulse Reading 2 (2013) © Michelle Lewis-King. Photo: Nick Fudge. Participants appear with consent.

the “wrong” position, i.e., other than where it is meant to be, it is clinically significant. For instance, if the practitioner feels a percussive “bowstring” sensation, which belongs to the register of Liver/Gall Bladder wave-images, at the level of 3 beans (which is at the level of the Lung/Large Intestine) instead of the location of 12 beans (at the level of the Liver/Gall Bladder pulse), this means a discordant relationship is developing between the Liver and Lung organ networks (Adams 2006: 26). Each of the organs and networks (known as *zàng-fǔ*¹⁵) are also associated with an element, color, tone, etc., which is further discussed in the “Composition” section below (Lewis-King 2013).

5.1 PERFORMANCE PROCEDURE

The performance itself is staged in a public space using the simple props of a table, chair, notepaper, ink, brushes, acetate, a laptop and a white coat. Participants’ pulses are individually recorded and interpreted. The collection of data is modeled on a medical history or “case-study” basis. Clinical impressions of the pulse are first notated under diagnostic categories (see Figure 4), e.g., “bowstring,” “slippery,” “replete,” along with the speed, vibratory qualities, fullness, emptiness, etc.

15. See the Glossary for a definition of this term.

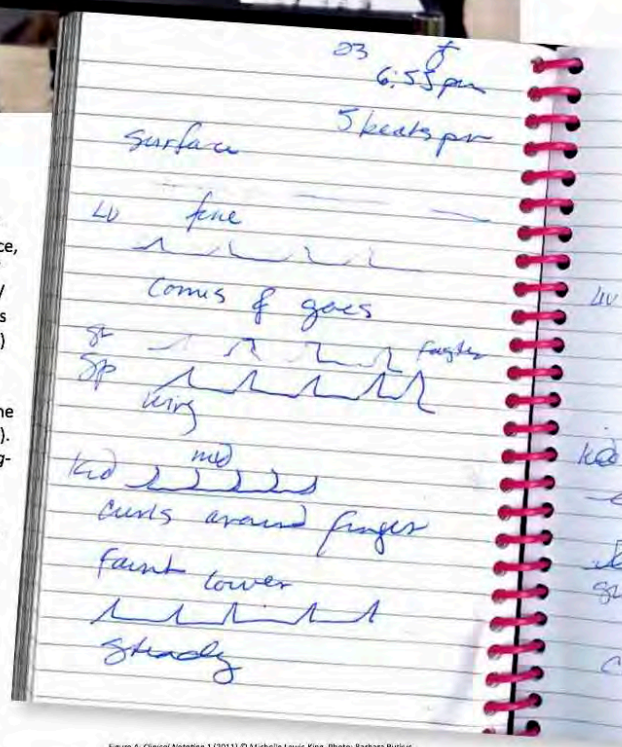
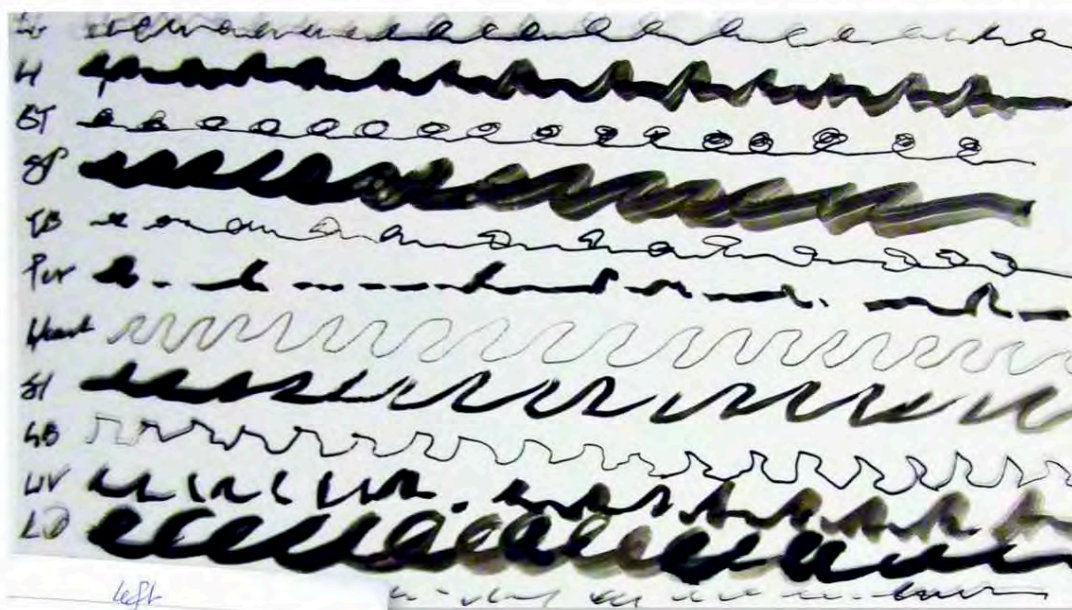


Figure 4: Clinical Notation 1 (2011) © Michelle Lewis-King. Photo: Barbara Buckus.

Then, each organ-network (channel) is illustrated and hand-drawn into a graphic notation. Participants are given an individualized graphic notation during the performance and a **SuperCollider** (SC) soundscape file (composed solely for them) post-event (see Figure 6).



left

HE fine

~~slightly Slighty~~

~~slightly Slighty~~ 4 beads

~~slightly Slighty~~

~~slightly Slighty~~

~~slightly Slighty~~

strained but jaunty

The graphic notations and “clinical” notes are used post-performance to translate each person’s pulse into algorithmic compositions assembled from modulated sine waves using SC (refer to Figures 4, 5 and 6). The notations and compositions of each participant

constitute individual samples of a larger overall research project that is archived online¹⁶ (Lewis-King 2013).

16 An archive of "anonymized" SC compositions of participants can be accessed on soundcloud [see: <http://soundcloud.com/cosmotronicsoma/sets>].

5.2 SUPERCOLLIDER SOUNDSCAPES

As mentioned in section 4, each *zàng-fǔ* pair is associated with one of the five elements: Fire, Earth, Metal, Water and Wood. These pairs are also associated with fundamental colors: Fire = Red, Earth = Yellow, Metal = Silver/White, Water = Indigo/Black, Wood = Green (Unschuld 1986: 256). Each of these elements possesses a fundamental musical tone that is associated with the traditional Chinese pentatonic scale: *gōng, shāng, jué, zhǐ, yǔ*. The frequencies I use in SC are calculated using these pentatonic tones (Cheng-Yih 1995: 44-48). The fundamental tone used for each overall composition, from which other tones of the pentatonic scale are calculated, is related to the element that most represents the participant. For instance, if the vibrations arriving from the Stomach position in the wrists form the dominant feature of the pulse, then the tuning will be determined by the frequency that represents the Earth tone as the fundamental tone for the pentatonic scale (roughly 440 Hz, as this forms a “central” tone). The tuning calculation for the pentatonic scales can be seen here in Figure 8 (Lewis-King 2013). Also, the twelve channels outlined in section 4 comprise the fundamental structural basis for my graphic notations and SuperCollider compositions (refer to Figure 5).

Instead of using SC to create logical musical arguments (as is standard), my use of SC intensifies its focus on *listening* as the basis for composing each landscape – adjusting the sine wave shapes and functions within each programming command by ‘ear’ in order to create sounds that match the fluid and electric-like nature of the vibrations I feel within people’s pulses. Clinical notes, drawings, and graphic notations generated from the performance are used to compose each SC command line so that the vibratory qualities of the drawn lines associated with each pulse position can be rendered as faithfully as possible. There is also an interpretative and intuitive element to reading peoples’ pulses which is central to my composing a sonic “portrait” of others and this allows me to place the traces of the “human” in dialogue with mechanical (Lewis-King 2013).

In order to faithfully convey the landscape of the body according to Chinese Medicine pulse diagnostics, each sine wave is carefully modulated to exemplify the signature qualities of pulse waveforms as described in the notations. For example, the

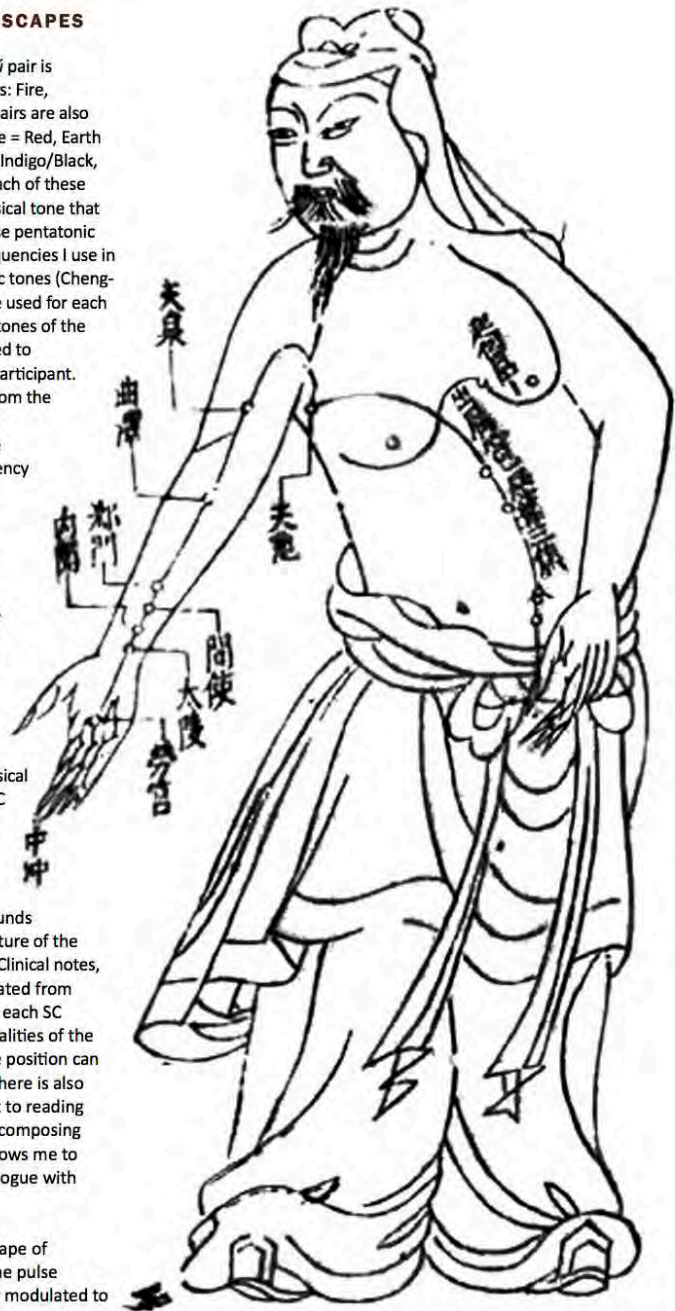


Figure 7: Acupuncture chart from the Ming Dynasty: The Pericardium Meridian of Hand-Jueyin. Ming Dynasty (1368–1644). Public Domain Attribution.

V&A_7.MP3

Leeds_7.MP3

Reading_1.MP3

Huddersfield_3.MP3

5.3 PULSE PROJECT SOUNDSCAPE SAMPLES

In the audio files 1–4 above, each sample varies in volume that represents the strength or faintness of each pulse impression. Some soundscape samples are more layered, and therefore certain sounds will only be audible at certain volumes. Please use headphones and adjust volume to obtain the desired “full” sound.

AudioObject 1: V&A_7 (2013) © Michelle Lewis-King.
AudioObject 2: Leeds_7 (2012) © Michelle Lewis-King.
AudioObject 3: Reading_1 (2013) © Michelle Lewis-King.
AudioObject 4: Huddersfield_3 (2013) © Michelle Lewis-King.

In utilizing touch as a translational tool and medium, I can connect art, science and technology with the complexity of ‘being’ in unique ways.

6. CONCLUSION

In using touch to blur the distinction between self and other as separate entities, an intersubjective space is created for exploration and study. By focusing on sound as a medium and the interior landscapes of the body in time as a ‘subject’, this research enacts a resistance to the primacy and fixity of vision and culturo-scientific themes which prioritize transcending the body in favor of the mind or the ‘general’ and ‘universal’.

In this way, this study seeks to provide a new means for producing and understanding sound relative to embodied experience and offers an examination of the unique means with which sonic research can form a translation and synthesis of different disciplines, e.g., medicine and art, eastern and western practices, etc. *Pulse Project* is also used as a relational tool, i.e., using touch as a method for *deep listening*¹⁷ and also as a method for creating sonic portraiture. *Pulse Project* introduces a new method for touching and transposing sound that uses ancient and pre-modern approaches to the body to reconsider contemporary practices. Through my sonic portraiture, I attempt to convey my findings on the “living” body. This internal-medicine-as-art portraiture is created as a contradiction to and

disruption of the Cartesian notion of the body-as-machine and the fixed representations of the body that were formulated from conducting dissections during the Enlightenment era – an ideological framework that continues to influence biomedical and technological conceptions and approaches to the body to this day (Vaccari 2012; Hsu 2005).

Also, as human touch blurs the distinction between self and other, the development of a new ‘science’ of touch based on the model of early Chinese pulse diagnostics is being used in this study to challenge and widen contemporary medical and technological discourse. This approach is in answer to the earlier question of how art can inform and open up uses of the scientific method. I use scientific method within the framework of an arts-based methodology (instead of the other way around) to challenge and redirect the dominant paradigm of using scientific method to legitimize arts-based research and to create new layers of meaning.

In utilizing touch as a translational tool and medium, I can connect art, science and technology with the complexity of ‘being’ in unique ways. This use of touch as a translational medium allows me to create sonic expressions that are faithful to the complexities and mysteries of human experience and existence. Rather than creating another human/machine

17 – American composer Pauline Oliveros is credited with coining the term in 1991 according to an interview conducted by Alan Baker for American Public Media in January 2003.

interface that is “interactive” and “user-focused” (thus mediating participation), this study publicly explores direct participation through the creation of intimacy between the artist and audience as a context for exploring the intimate relationship between art and science. As a method which attempts to include and be responsive to the participants of the research and in response to the participant offering themselves to be part of the research, the graphic notations and bespoke compositions are given freely as a “gift” to each participant. Each set of works exists as a unique form of visual and sonic portraiture of the participant, as an aesthetic document of the intimate and temporally significant encounter between practitioner and participant (Lewis-King 2013).

GLOSSARY

Qi – Described as an all-pervasive life force, this energetic substance is the basis for Chinese medicine and science. It is the material of transformation itself and the range of transformations could be understood to be as wide as the cosmos itself, travelling from the density of a white dwarf to the briefest emanation of quantum particles. In Chinese medicine, practitioners try to manipulate the flow of this energy to assist healing based on Chinese Medical principles (Eisenberg and Wright 1995).

Wūxíng – Often called the ‘five phases’ or elements (Earth, Fire, Metal, Water and Wood), this term describes a systematisation of phenomena into five distinct movements or phases. These phenomena could describe the movement and characteristics of the changing seasons of spring, summer and so on. These elements have a specific relationship and order in relation to each other. One element may generate or control another, i.e., winter generates spring, whereas autumn is in contrast to spring. These elemental phenomena could describe the phasic interaction between cosmological entities or between the organs of the body as the early Chinese saw them (Rochat de la Vallée 2009).

Yīnyáng – Describes two opposing yet interdependent and interconnected primal forces that are characterised by such phenomena that are cyclical or on a spectrum, such as ‘day and night’, ‘hot and cold’, ‘internal and external’, etc. This continually shifting pair of opposites constitutes the fundamental basis for early Chinese philosophy and science (Sivin 1995).

Zàng-fǔ – **Zàng** refers to the five yīn organs of the body: Heart/Pericardium, Spleen, Liver, Lung, Kidney. **Fǔ** refers to the six yáng organs: Large Intestine, Small Intestine, Gall Bladder, Urinary Bladder, Stomach, Triple Burner. These **zàng-fǔ** each have an associated channel that extends the energy of the organs along points across the body. A simple definition of the functions of the **zàng-fǔ**: the five yīn organs are said to “store” and produce essential fluids, while the six yáng organs transform essences into production of movements/energy (Unschuld 1986).

Scilang – SuperCollider programming language that uses an object-oriented and functional language syntax similar to C programming language (Wilson et al 2011).

Scsynth – SuperCollider synthesis server which supports multiple input and output channels and uses a “bus system” to match programming commands with sound objects (Wilson et al 2011).

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I would like to firstly acknowledge the *Cultures of the Digital Economy Research Institute* at Anglia Ruskin University for their generous support of my research. I would also like to thank my supervisors Dr. David Ryan, Dr. Richard Hoadley and Dr. Milla Tiainen for their excellent guidance on this project.

REFERENCES

- Adams, Joseph. “Bringing the Nan Jing to Life: Pulse Taking and Diagnostics from the Classic of Difficulties.” *American Acupuncturist* 35 (2006): 25–27. Print.
- Ambrosio, C. *Art for the Sake of Science: Artistic Visualization as “Critique” at the London School of Economics*. Abstract, June 2013. Web. 22 Aug. 2013. <<http://visualrhetoric.ac.uk/event/1879/>>.
- Baker, Alan. “An Interview with Pauline Oliveros.” *American Public Media*, January [2003]. Web. 15 Aug. 2013. <http://musicmavericks.publicradio.org/features/interview_oliveros.html>.
- Beringer, Philip. “Introduction: the ‘science wars’.” In *After the Science Wars: Science and the Study of Science*. Keith Ashman and Philip Beringer (Eds.). Routledge, London, 2001. Print.
- Cheng-Yih, Chen. *Early Chinese Work in Natural Science: A Re-examination of the Physics of Motion, Acoustics, Astronomy and Scientific Thoughts*. Hong Kong: Hong Kong University Press, 1995. Print.
- Conquergood, Dwight. “Rethinking ethnography: towards a critical cultural politics.” *Communication Monographs*, June 56 (1991): 179–94. Print.
- Ede, Stan. *Art and Science*. I.B. Tauris & Co. Ltd., London, 2005. Print.
- Eisenberg, David, Wright, Thomas Lee. *Encounters with Qi: Exploring Chinese Medicine*. New York: W.W. Norton and Company, 1995. Print.
- Eisner, Elliot. “On the Differences between Scientific and Artistic Approaches to Qualitative Research.” *Educational Researcher*, 10.4 (1981), 5–9. Print.
- Erokhin, Semen. “SCIENCEART: science-art.ru.” *Moscow State University*, Sept. 2013. Web. 25 Aug. 2013. <<http://www.science-art.ru/e.php>>.
- Flaws, Bob. *The Secret of Chinese Pulse Diagnosis*. Boulder, CO: Blue Poppy Press, 1995. Print.
- Halpern, Megan. “Across the great divide: boundaries and boundary objects in art and science.” *Public Understanding of Science*, November 21.8(2011), 1–18. Print.
- Hsu, Elisabeth. *The Transmission of Chinese Medicine*. Cambridge: Cambridge University Press, 1999. Print.
- Hsu, Elisabeth. “Tactility and the Body in Early Chinese Medicine.” *Science in Context*, 18.1(2005): 7–34. Print.
- Imrie, Robert H., Ramey, David W., Buell, Paul D., Ernst, Edward and Basses, Stephen P. “Veterinary acupuncture and historical scholarship: claims for the antiquity of acupuncture.” *The Scientific Review of Alternative Medicine*, 5 (2001) 133–9. Print.
- Irwin, Robert. “Media Study: Robert Irwin.” *Artforum*, 51.1 (2012): 405. Print.
- Jullien, François. *A treatise on efficacy: between Western and Chinese thinking*. University of Hawaii Press, Honolulu, Hawaii, 2004. Print.
- Kapchuk, Ted. *The Web That Has No Weaver: Understanding Chinese Medicine*. RossettaBooks LLC, New York, 2010. Print.
- Koski, Kaisu. “Art Portraying Medicine.” *Journal of Research Practice* 1.1 (2011). Web. 20 March 2013. <<http://jrp.casop.org/index.php/jrp/article/view/259/235>>.
- Larson, Kay. *Where the Heart Beats: John Cage, Zen Buddhism and the Inner Life of Artists*. USA: Penguin Group Incorporated, 2013. Print.
- Lewis-King, Michelle. “Touching as Listening: Pulse Project.” *Journal of Sonic Studies*, 4.1 (2013). Web. 15 Aug. 2013. <<http://journalsonicstudies.org/vol04/n01/a12/>>.
- Moran, Patrick Edwin. *Chinese Music and Gamut and Scales*. Citation for first two columns but with 16384/19883, 131072/177147, and 32768/59049. 2011. Web Image of Chen, Joseph CY. *Early Chinese Work in Natural Science: A Re-examination of the Physics of Motion, Acoustics, Astronomy and Scientific Thoughts*, p. 99. wikimedia commons. 1995. Print. Web. 10 March 2013. <https://commons.wikimedia.org/wiki/File:EarlyChinese_Music_Gamut_326_Scales.jpg>. Image. Creative Commons Attribution-Share Alike 3.0 Unported license.
- Ohrhällinger, S. and Mudur, S. “An Efficient Algorithm for Determining an Aesthetic Shape Connecting Unorganized 2D Points.” *Computer Graphics Forum*, June (2013), n. pag. Web. 28 Aug. 2013. <<http://onlinelibrary.wiley.com/doi/10.1111/cgf.12162/abstract>>.
- Rochat de la Vallée, Elisabeth. *Wu Xing, Tao, New Mexico*: Redwing Book Company, 2009. Print.
- Rothman, Lily. “Buzzwords: ‘Art Science’ is the New Art-World Trend.” *Time Magazine*, 1 June 2012, n. pag. Web. 25 Aug. 2013. <<http://entertainment.time.com/2012/06/01/buzzwords-what-the-heck-is-art-science/>>.
- Segestrale, Ullica. “Science and Science Studies: Enemies or Allies?” In *Beyond the Science Wars: The Missing Discourse about Science and Society*. Ullica Segestrale (Ed.). State University of New York Press: New York, 2000. Print.
- Scheid, Volker. *Chinese Medicine in Contemporary China*. Duke University Press: Durham, North Carolina, 2002. Print.
- Sivin, Nathan. *Science in Ancient China. Researches and Reflections*. Aldershot: Variorum, 1995. Print.
- Stengers, Isabelle. *Cosmopolitics I* (Robert Bononno trans.) The University of Minnesota Press: Minneapolis, Minnesota, 2010. Print.
- “The Science Gallery.” sciencegallery.com, 2013. Web. 25 Aug. 2013. <http://sciencegallery.com/this_is_science_gallery/>.
- Unschuld, Paul. *Nan-Ching: The Classic of Difficult Issues*. Berkeley: University of California Press, 1986. Print.
- Unschuld, Paul., Tessenow, Herman and Zheng, Jingsheng. *Huang Di Nei Jing Su Wen: An Annotated translation of Huang Di's Inner Classic – Basic Questions*. University of California Press: Berkeley, California, 2011. Print.
- Vaccari, Andrés. “Dissolving Nature. How Descartes Made Us Posthuman.” *Techné: Research in Philosophy and Technology* 16.2 (2012): 138–186. Print.
- Wilson, Scott, David Cottle, and Nick Collins. *The SuperCollider Book*. Cambridge: MIT Press, 2011. Print.
- Wong, Kate. “Small Wonders: Science Meets Art Under the Lens.” *Scientific American*, 17 Dec. 2012, n. pag. Web. 25 Aug. 2013. <<http://www.scientificamerican.com/article.cfm?id=small-wonders-science-meets-art-under-lens>>.
- Zarcone, Thierry. “China as Philosophical Tool.” François Jullien in Conversation with Thierry Zarcone.” *Diogenes*, November, 50 (2003): 15–21. Print.

Pulse Project

a sonic investigation across body,
culture and technology

by Michelle Lewis-King

Michelle Lewis-King is an artist-acupuncturist, lecturer and PhD research fellow for the Cultures of the Digital Economy Research Institute, Anglia Ruskin University and her research investigates the cultural interfaces between art, medicine and technology. Michelle's artistic research explores the practice of Chinese medicine as a critical and performative intervention within the contexts of (western) biomedical clinical praxis. Her research has published in the *Journal of Sonic Studies* and *ELSE Journal for Artistic Research*, and her work has also been recently exhibited at the V&A Museum, Ex-Teresa Museum (Mexico) and Spike Island.

<http://codephd.wordpress.com>

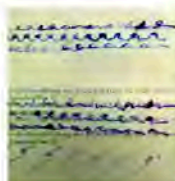
Figure 1: Pulse Reading
Cambridge 1 (2014)
© Michelle Lewis-King
Photo: Léna Lewis-King

Reflections on Process



A set of Pulse Project compositions
can be found on sound cloud:

<https://soundcloud.com/cosmosonicsoma/sets>



'Pulse Landscapes', a collection of 14
encounters, were released on Clang and
can be found at:

<http://clang.cl/pulse-landscapes-2>

1. Introduction

One of the fundamental characteristics of my practice as an artist and acupuncturist is an enduring interest in the human body and its processes, e.g., a fascination with the ecosystems and rhythms of the body, in sensorial experience, in thinking of the body as a formal landscape, etc. This fascination with the body and embodied process is complemented by another key concern, which is characterised by my practical and theoretical meditation on the

Pulse Project

aesthetic, anthropological, social and ethical aspects that arise from the relationship between the self and others. In my work I explore these reflections on embodied processes and the relationality between the self with others from a transdisciplinary perspective, one which draws on my experience of training and working in both art and science contexts.¹ My transdisciplinary practice manifests as a creative engagement with the ontology of listening to and 'caring' for others from the two processual² vantages of art and science.

It is in this spirit that my current research utilises my artistic practice in tandem with my clinical experience as an acupuncturist (this experience includes investigating patients' biomedical conditions in addition to formulating treatment strategies according to the knowledge systems and traditions of Chinese medicine). The aim of my research is to formulate a social sonic practice that critically explores art, medicine and technology practices from a broader cultural perspective – one where Western approaches to the science and technology studies are not the dominant perspective.

¹ Originally trained as a sculptor (1996 -1994), I began working with sound and sound installations when I studied for my MA in sculpture at Chelsea College of the Arts in 1994 and continued to exhibit my sound work until returning to university in 2002. Between 2002-2005, I studied biomedicine and Chinese Medicine: Acupuncture at the University of Westminster, receiving a BSc in Acupuncture in 2005 and continued my studies on Chinese Herbal Medicine and biochemistry 2008-2009. I also ran a full time clinical practice between 2005 – 2011 before undertaking my current PhD study.

² Please refer to the Glossary at the end of Section 5 for a definition of this term.

As this article forms a reflection on how I apply my clinical knowledge to my creative practice, I have organised it in the following manner: Section 2 – In this first section I reflect on the physical, theoretical and metaphysical dynamics of the clinical encounter. In Section 3 I provide an account of my creative practice research case study titled *Pulse Project* (2011–2014), which is a sound research performance series investigating the relationship between the researcher and participants (this study also draws contemporary and historic connections between art, the humanities, medicine and technology). In Section 4 I provide further reflections on some of the implications raised by the sonic processes of my creative practice research. Section 5 provides a final summary of my practice.



Figure 2: *Pulse Reading* at the V&A, London 2013
© Michelle Lewis-King. Photo: Nick Fudge

2. The artist-acupuncturist: the convergence of art and science

As a fine artist who undertook medical training and the establishment of a clinical practice, I had first to subject myself to certain constraints and responsibilities that scientists are subject to, e.g., the rigors of studying biology, anatomy, physiology, pathophysiology, differential diagnosis and evidence-based medicine research – of obeying strict clinical protocols and ethical codes, prioritize the care of others as a profound charge. Yet, at the same time, and more in line with the concerns of my artistic practice, I studied bodily process from the metaphysical approach of early Chinese medicine where the body can be understood to be an assembled cosmological landscape that is shaped and altered by continuous alchemical processes.³

It was this experience of continually working with embodied alchemical processes that became central to my practice as an artist-acupuncturist. Chinese medicine methodology enabled me to regard the body from another perspective, offered creative strategies for interacting with and intervening into the emergent spaces of the body (as interventions that are simultaneously medical and artistic) and allowed me to think poetically about the bodily processes of others. To explore further how I connect the

³ I will give an introduction to these alchemical processes in Chinese medicine in Section 3.3 (where I will also give an account of how these alchemical processes inform my composing process). Additionally, please see the terms *wuxing* and *yinyang* in Glossary as these concepts form the fundamental theoretical basis for understanding alchemical process according to Chinese medicine.

performative aspects of medical practice with artistic practice, the next section presents a reflection on the clinical encounter of Chinese medicine and the manner in which it is able to bring poetic and scientific speculation and production together.

2.1. A clinical encounter case study: questioning, listening and responding

In this section I offer an account of a 'typical' acupuncture clinic encounter to give an example of the thoughts, experiences and perspectives of this type of clinical situation. This example provides a point of reference for how the intimate, diagnostic and prescriptive aspects of the clinical encounter can be reconsidered and reconfigured into a wider sense of experimentation, interpretation and play via the creation of performances, drawings and bespoke soundscapes.

Though S has been consulting with her GP for several years about her dysmenorrhoea (painful periods), high blood pressure and excessively cold hands and feet and has been coming to see me at the clinic for several months in search of another approach. S sits next to me and I ask her questions about her experiences over the week since I last saw her, i.e., what is better and what needs focusing on. I listen carefully to the events, impressions and situations she wants me to pay attention to as she speaks about her week. I not only look for symptomatic 'signs' or listen to keywords, but I also listen for tones and inflections in her voice and bodily gestures conveying her state of being. It is this intensive

form of listening that directs me towards a deeper understanding of her 'condition' and also informs my treatment strategy.⁴ But it is the reading of her pulse that provides the deepest understanding of what might be taking place internally. To take S's pulse using Chinese pulse diagnosis is to step sideways from the biomedical

⁴ The treatment strategy in *acumoxa* therapy refers to the set of acupuncture points a practitioner selects, (the acupoint locations along the meridians), the direction in which the needles should be inserted and twisted (these techniques affect the direction, amplitude and flow of energy and blood) and whether the points should be warmed with moxa (mugwort – *Artemisia argyl*) etc. These decisions are directed by specific Chinese Medicine therapeutic principles. For more information please see: Vivienne Lo's, 'The Influence of Western Han Nurturing Life Literature on the Development of *Acumoxa* Therapy' in *Innovation in Chinese Medicine: Festschrift in Commemoration of Lu Gwei-djen*, ed. Elisabeth Hsu (Cambridge, CUP 2001), 19–51.

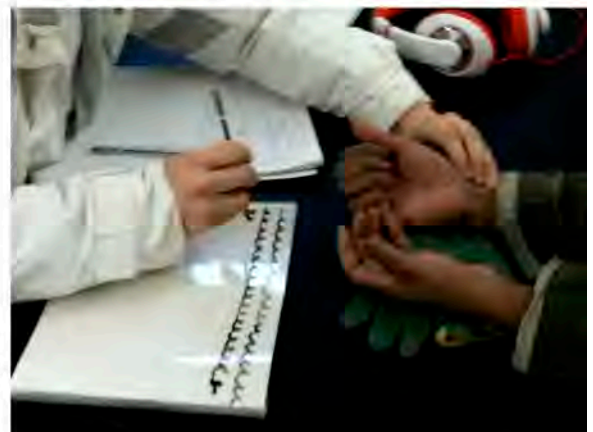


Figure 3: *Pulse Reading* at the V&A, Detail, London 2013
© Michelle Lewis-King
Photo: Nick Fudge

epistemological approach of measuring and plotting the body via grids and vectors and instead – to listen through touch to the warp and weft of the *shén* (spirit/consciousness), *qì* (active energy or transformative agent existing both within the body and throughout the universe), *jīng-luò* (the networks/meridians running throughout the body), *jīnyè* (body fluids), *xuè* (blood) and *zàng-fū* (organs). Chinese pulse diagnosis offers a methodology for listening to the interior worlds of others with a complexity that exceeds simply quantitatively counting heart-beats or listening for irregular sounds with a stethoscope. If a practitioner is sensitive and extensively trained in Chinese pulse diagnosis, according to early Chinese medical texts, the entire cosmology of the body and state of consciousness can be read at the meeting place of the 'vessels' – at the wrist (Hsu, 1999; Unschuld, 1986).

The physical characteristics and other impressions received from each pulse reading consultation are then written down as 'clinical notes'. This form of notation is an integral part of the diagnostic process, which also includes the processes of interpretation and 'recording' (i.e. making a record of what is 'significant' about the person's pulse and interpreting how these findings provide a 'picture' of what is occurring within the person in relation to the concerns the person initially presents with). These diagnostic records also inform the physician on what form of intervention or tactic they might adopt.

It is this juncture within the clinical encounter – the diagnostic process – that my research reflects on and extends through

adopting artistic methodologies that amplify the creative and experimental aspects of the diagnostic process in order to examine them further through 'play'. In my work I look to separate out the swift and easy relationship between a cause and its effect that typically occurs during scientific/medical investigation process, i.e., the *ipso facto* relationship between a diagnosis and a treatment within the clinical setting. Instead of participating in the 'stabilization' of diagnostic meaning or in creating a predictable clinical scenario, in my sound work, I am interested in the materiality of the diagnostic process, in exploiting, teasing out and elongating this moment of 'experimental inscription' (Latour and Woolgar, 1986, 88) and 'play' that exists between these modes of constructing logical scenarios in the clinic (or what might be considered the creation of 'ritual' in another context). When the diagnostic process becomes purely creative, a physician is free to 'play'. Clinical notes could be then transformed into musical notes, graphic notations and drawings and the moment of the encounter between themselves and others can become a form of music.

3. 'Pulse Project', a pataphysical⁵ translation of the clinical encounter

In this section (and its subsections), I discuss my doctoral research project *Pulse Project* in order to explore the processes of artistic

⁵ Pataphysics, originally defined by Alfred Jarry as the 'science of imaginary solutions' (Bok, 2001, 88) is fundamental to informing my approach in bringing art and science into conversation. For further reading on the imaginary science of pataphysics, please see Christian Bok's *Pataphysics: The Poetics of an Imaginary Science* (2001).

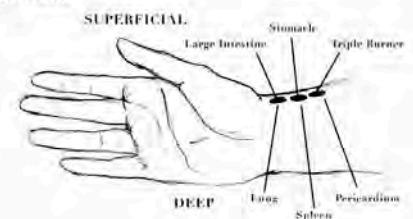
418

translation of the following: a) a method of pulse diagnosis that allows a physician to listen more deeply to the range of vibrations and oscillations within others, b) the creative moments of analysis and speculation of what is occurring within the interior universe of another person via clinical notation, c) the unique form of intimacy that exists within a performative clinical encounter that is both public and intensely private – which also results in the creation of a unique soundscape, d) the ellipse of the playful, poetic, experimental and serious aspects of formulating a medical intervention, and the subsequent healing transformation that occurs within the body of another (and between us as a life force).

Pulse Project (2011–2014) is a performance and sound study series that creates new connections between artistic, medical, and technological practices. In this study, I embody research practice itself through becoming an instrument or medium between myself and others and between cultural traditions for understanding and mediating the body. Pulse 'reading,' case histories, notations of pulses and programming soundscape compositions are all used together as tools for exploring the cultural encounter between artist, audience and medicine.

In trying to listen deeply into the internal vibrations of others from the position of intuitive and corporeal experience, *Pulse Project* takes its sonic inquiry of the clinic and attempts to open it outwards towards the direction of lived experience. As building rapport is a crucial part of my methodology, this study also engages with and

Right Hand



Left Hand



Figure 2. Pulse Reading Positions (2013) © Michelle Lewick-King

49

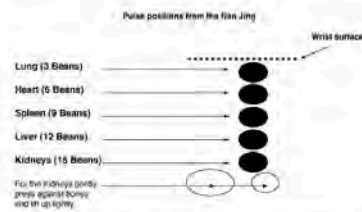


Figure 5: Nan Jing Pulse Diagram (2013) © Michelle Lewis-King

includes the complex 'presence' of participants within its approach to listening and composing. The software SuperCollider (an audio programming language) is used to compose bespoke algorithmic soundscapes. These soundscapes are not sonifications of western principles of circulation but offer another perspective to conceive of/listen to the interior spaces of the body – as each participant's pulse is interpreted as a unique set of sound-wave images based on traditional Chinese pulse diagnosis (a complex set of 28+ waveform images corresponding to states of being) and also according to traditional Chinese music theory (Lewis-King, 2013).

In using a sensitising form of touch to connect with participants, this temporal, interrelational and embodied aspect of my creative practice instantly builds a mutual trust and rapport between myself and participants in the study and the creation of soundscapes that

digital 'instruments' alone cannot produce, thus developing a hybrid form of techne that places intuitive, embodied and temporal forms of material knowledge and experience into a dialogue with the rationalist architectures of a digital programming language.

3.1 The pulse reading process

On each wrist, there are three positions where the fingers are placed in order to palpate the pulse and this makes a total of six positions of palpation altogether (refer to Figures 4 and 5). From each position, the practitioner registers at least two levels from which the pulse waveform qualities can be felt and are referred to as 'superficial' and 'deep' (making a total of 12 points of palpation altogether for the pulse). Each position is also associated with specific organs and networks called zàng-fù.⁶

Each position has a designated lexicon of pathological and physiological ideal 'pulse waveform images'. For example, at the middle position on the left wrist (the position of the Liver and Gallbladder zàng-fù pair), there is a list of corresponding images: 'bowstring', 'choppy', 'replete', 'fine', etc., and these waveform images (and their amplitude and vibratory quality) reveal the state of health of that network (Flaws, 1995; Lewis-King, 2013). There is more 'data' than just the pulse images and vibrations, a practitioner also intuits other sorts of information from touching others, i.e., how they feel about their place in the world, their living situation, an image of courageousness or a sense of their being diminished, etc.

6 Refer to the Glossary for the definition of this term.

During the performance, each pulse reading case study is recorded through producing a set of notes of clinical impressions based on Chinese medicine therapeutic principles (see Figure 6). A hand drawn graphic notation of each person's pulse is also produced as part of the performance consultation. This notation is given to each participant of the performance as a record of the encounter and as an artwork that is created uniquely from and for them (see Figures 7 and 8). Each notation is a live translation of the unique waveforms of the participant's pulse at that moment in time.

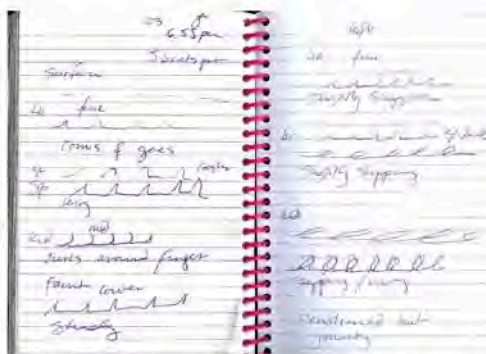


Figure 6: Clinical Notations 1 (2011) © Michelle Lewis-King. Photo: Barbara Butkus

Each notation is also a recording of the circuit between myself and others – an inscription of the moment of my breathing (and their breathing), of touching (and their being touched), of listening (and their being listened to), of interpreting and responding (and their being interpreted and responded to). Each notation is also a crucial aide memoire to the composing process of each soundscape as the lines of the notation remind me of the sensation of each waveform impression. The strength or weakness of each line informs me on the strength or weakness and unique signatures of each waveforms felt on the wrist. The drawn lines also describe more than just clinical 'data'. I perceive/intuit something about each person from the moment of being literally in touch with them. This 'something' can be an image that suddenly arrives in my mind or a particular musical signature or cadence, etc., and each of these 'extra' impressions help me to meditate on each person as a unique symphony of embodied being.

3.2 The composing process:

Composition occurs in rhythmic processual⁷ layers. The first layer is performance in which I gather data using the human technology of (diagnostic) touch, produce interpretations of pulse impressions, create records and notations, etc. The second phase of the composing process is the translation of the notations into a digital language of commands (as sound 'objects')—the third phase is the playback of soundscapes via sound installation (this layer manifests the interior infrasonic body into an exterior set of sonic bodies).

7 See the Glossary for a definition of this term.

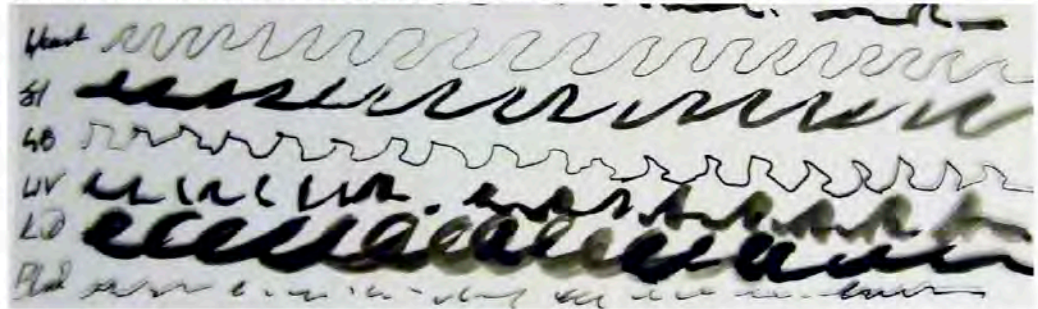
Though the software I use (SuperCollider®) is used as a live-coding audio synthesis instrument by the majority of its users in practice, I find I need the time, quiescence and psychic space to consider each person, their pulse reading and what my response will be before I compose each piece. So whilst the composing of clinical notations and graphic notations occurs 'live' (during the performance), the process of composing each of the algorithmic scores takes place in my studio quite a bit time after the live performance event (some compositions can take up to a couple

8 For more information on SuperCollider (including tutorials and free software downloads), please visit: <http://supercollider.sourceforge.net/>

of months, especially if there is a long queue of them). I use SuperCollider's programming language because it enables me to specify the shape, pitch, tempo, dynamic range, etc., of each waveform line that is demonstrated in the accompanying graphic notation (see Figure 8). I also prefer SuperCollider to other audio synthesis programmes for the wide range of dynamic and fluid sounds it produces.

The algorithmic composition process is also informed by the 'treatment strategy' and 'prescription' functions of the clinical encounter. These functions of the clinical encounter are then

Figure 7: Graphic Notation – Cambridge 1 (2014) © Michelle Lewis-King. Photo: Lëna Lewis-King



52

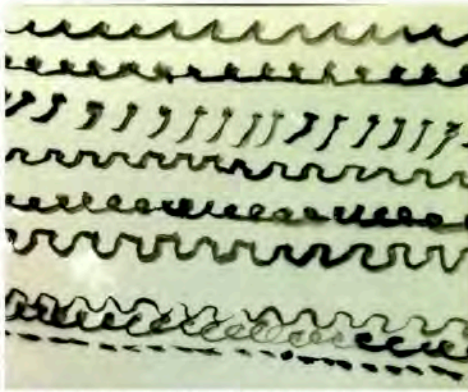


Figure 8: Graphic Notation – V&A (2013) © Michelle Lewis-King.

extended further into creative interpretation and the production of soundscapes. Within each composition I consider each person who has participated in the performance very carefully. Each of the tones/frequencies, amplitudes, etc., selected as part of the composition process have been informed by my reading of that individual's pulse in relation to the 'therapeutic' principles of Chinese medicine and music theories (this is explained further in

the next section). In addition to being an artistic interpretation of the encounter with another person (as a portrait that is inscribed and sculptured by sound), these soundscapes are composed to describe a relationship of 'care'—of listening to and caring about another person as a creative act. I meditate upon each person's pulse not simply as a set frequencies, waves and rhythms, but in as a considered, playful and caring (therapeutic) response to the life of each person and to their act of generosity in offering of themselves to be read by me.

```
//Intermittent/Irregular Gbbp Female: 70's - Zhi Scale (Low)
{
  a= {LFPulse.ar(99,0,LFTri.kr(0.6,0,0.7,0.5),0.02)}.play(outbus:1);
  //produces pulsating saw tooth sounds
  b= {LFPulse.ar(98,0,LFTri.kr(0.6,0,0.5,0.5),0.02)}.play(outbus:0);
  // Synth definitions 'c' through 'g' represent the Yang Zhi Scale
  c= {SinOsc.ar([399.86, 399.86], mul: LNoise0.kr([2, 2]).max(0) * 0.05)}.play(fadeTime: 7); // Red = Fire Pitch
  d= {SinOsc.ar([409.02, 409.02], mul: LNoise0.kr([4, 4]).max(0) * 0.05)}.play(fadeTime: 7); // Yellow = Earth Pitch
  e= {SinOsc.ar([530.29, 530.29], mul: LNoise0.kr([4, 4]).max(0) * 0.05)}.play(fadeTime: 7); // White/Silver = Metal Pitch
  f= {SinOsc.ar([589.86, 589.86], mul: LNoise0.kr([2, 3]).max(0) * 0.05)}.play(fadeTime: 7); // Indigo = Water Pitch
  g= {SinOsc.ar([657.95, 657.95], mul: LNoise0.kr([2, 2]).max(0) * 0.05)}.play(fadeTime: 7); // Vermillion = Wood Pitch
  // Synth Definitions 'h' through 'j' produces random oscillations to match irregularities evidenced in the pulse
  h= { var ctl = HPF.kr(LFSaw.kr(0.3), SinOsc.kr(XLine.kr(0.03), 60, 20, 22));
  SinOsc.ar(ctl * 116 + 130.81, mul: 0.07);
  }.play(outbus:1);
  i= { var ctl = HPF.kr(LFSaw.kr(0.3), SinOsc.kr(XLine.kr(0.03), 60,
```

Figure 9: Sample of SuperCollider Composition (2013). Screenshot © Michelle Lewis-King

53

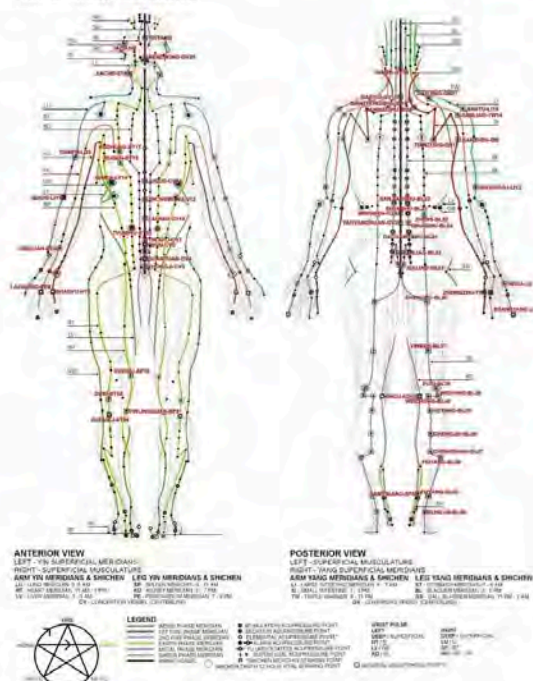


Figure 10: Acupuncture Chart of the Meridians. (2010) KYDP. Wikimedia Commons. Public Domain Attribution

3.3. A brief introduction to Chinese medicine and music theories that inform each SuperCollider composition:

According to the *Huángdì Nèijīng*, a seminal Chinese medicine text compiled by unknown authors from as early as the 3rd and 4th century BCE, (Unschuld and Tessenow, 2011), there are 5 yīn[®] zàng organs: the Spleen, Liver, Heart, Lung and Kidneys, and 6 yáng[®] fū organs: the Stomach, Gall-Bladder, Small Intestine, Large Intestine, and Bladder (Unschuld, 1986, 408). Each of the zàng and fū organs possess an associated energetic network, or 'channel' that runs between the depths of the organ to the outer reaches of the body (Unschuld, 1986, 408). The Pericardium, as an organ which encloses the Heart is regarded in Chinese Medicine as the 'Heart protector' and is thought of as an 'extra' organ of the Heart zàng (Unschuld, 1986, p. 312). So, when we include the 'extra' yīn Pericardium organ-network, the total zàng-fū organ-network pairs make a total of 6 pairs and twelve energetic networks or channels (see Figure 10). As it is these twelve channels that emerge from the six yīnyáng zàng-fū pairs that are felt for and listened to in the pulse (and are therefore fundamental to pulse reading), the twelve channels form the fundamental structural basis for my graphic notations and SuperCollider compositions (Lewis-King, 2013).

Each zàng-fū pair are also each associated with one of the following five elements or wǔ xíng¹¹: Fire, Earth, Metal, Water and Wood i.e., Stomach/Spleen = Earth, Lung/Large Intestine = Metal, Kidney/

- 9 See the Glossary for this term.
10 See the Glossary for this term.
11 See the Glossary for this term.













	12	Ratios	Calculate	Calculate	Calculate	Calculate	Calculate	Calculate	Calculate	Calculate	Calculate				十二律
	Lu	Used for	from	from	from	from	from	from	from	from	from				
	Names	Calculations	440.0	449.86	463.80	528.64	556.88	594.30	629.13	660.00	704.79	742.50	792.88	835.31	
	Huang Zhong	1/1	440.00	469.86	495.00	528.64	556.88	594.39	629.48	660.00	704.79	742.50	792.88	835.31	黃鐘
	Du Lu	2187/2048	469.86	501.75	528.60	564.52	594.67	634.75	669.00	704.79	752.63	792.89	846.67	892.01	大呂
	Da Cu	9/8	495.00	528.60	556.88	594.73	629.49	668.68	704.79	742.50	792.89	835.31	891.97	939.73	太簇
	Ja Zhong	1968/1630	528.64	564.52	594.73	635.15	669.07	714.13	752.70	792.97	846.79	892.09	952.59	1003.60	夾鐘
	Gu Xian	87/64	556.88	594.67	626.48	669.07	704.79	752.72	792.89	835.31	892.01	939.73	1003.46	1057.19	姑洗
	Zhong Lu	1171/1311	594.39	634.73	668.68	714.13	752.72	802.94	846.50	891.58	952.09	1003.46	1071.06	1128.40	仲呂
	Rui Bin	729/512	626.48	669.00	704.79	752.70	792.89	846.30	892.01	939.73	1003.51	1057.19	1128.90	1189.34	蕤賓
	Lin Zhong	3/2	660.00	704.79	742.50	792.97	835.31	891.58	939.73	990.00	1057.19	1113.75	1189.29	1252.97	林鐘
	Yu Ze	6661/4096	704.79	752.67	792.89	846.79	892.01	952.09	1003.51	1057.19	1128.95	1189.34	1270.01	1338.01	夷則
	Nan Lu	27/16	742.50	792.89	835.31	892.09	939.73	1003.03	1057.19	1113.75	1189.34	1252.97	1337.95	1409.59	南呂
	Wu Yi	5905/3277	792.86	846.67	891.97	952.59	1003.36	1071.06	1128.90	1189.29	1270.01	1337.95	1428.70	1505.19	無射
	Ying Zhong	243/128	835.31	892.01	939.73	1003.60	1057.19	1128.40	1189.34	1252.97	1338.00	1409.59	1505.19	1585.79	應鐘
			Yu scale on Huang Zhong base freq.		Shang on Da Cu base freq.			Gong scale on Zhong Lu base freq.			Jue scale on Yu Ze base freq.		Zhi scale on Wu Yi base freq.		

Figure 11: Chinese Music and Gamut and Scales. (2011) Joseph C.Y. Chen and Patrick Edwin Moran. Wikimedia Commons. Creative Commons Attribution-Share Alike 3.0 Unported license.

Bladder, Water, Liver/Gall Bladder = Wood, Heart/Small Intestine = Fire, Triple Heater/Pericardium = 'Ministerial' Fire.¹² The zàng-fū pairs are also associated with fundamental colours: Fire = Red, Earth = Yellow, Metal = Silver/White, Water = Indigo/Black, Wood = Green (Unschuld. 1986: 256). Each element also has a

fundamental musical tone associated with the traditional Chinese pentatonic scale, i.e., gōng, shàng, jué, zhǐ, yǔ. The frequencies I use are calculated using traditional pentatonic tones (Cheng-Yih, 1996, pp. 44–48; Lewis-King, 2013). (See Figure 11) A more detailed explanation regarding the significance of these pentatonic frequencies/pitches and their relationship to the zàng-fù is given below in Section 3.4.

12 The organs as conceived of by Chinese Medicine are capitalised here to differentiate them from the same organs that we conventionally recognise within biomedicine.

3.4 Soundscape composition as a healing modality

The standard practice for SuperCollider programmers and community of users is to create logical arguments for each sound object as the basis for composing. Whereas my use of SuperCollider programming language intensifies its focus on listening as the basis for composing each landscape. I adjust the shapes and functions within each programming command by 'ear' in order to create sounds that match the fluid and electric-like nature of the vibrations I feel and intuit within people's pulses. Each clinical impression and graphic notation produced from the performance create a record of the moment of being 'in touch' with another person. These notations inform my meditation on and interpretation of the particular rhythms and cadences of another person and also aid my interpretation of the energetic movements that pass between another and myself. These interpretations are then translated into sound using SuperCollider.

In order to convey the landscape of the body according to Chinese Medicine pulse diagnostics, each SuperCollider synth sine wave is modulated to exemplify the signature qualities of the pulse waveforms described in the notations. For example, the command 'lSinOsc.ar(262.dup, mul: LfNoise2.kr(3, 3).max(0) * 0.009).play;' corresponds to an aspect of a pulse emitting a 'fine, slow, and irregular' oscillation along the 'Spleen' channel. The gong tone – at the frequency of 262 Hz – corresponds to the Spleen and Stomach networks. It is used in my composition to both represent and 'boost' the energy of the Earth zàng-fū network. The gong pitch is

associated with the Earth zàng-fū because this pitch/frequency is considered to be the most therapeutic tone/vibration for the 'Earth' zàng-fū network according to Chinese medicine theory (Gao et al, 2010). A basic explanation of the logic of SuperCollider code is given in the footnote below.¹³

Each *Pulse Project* composition is constructed to both mirror my impressions of an individual's pulse reading, yet 'therapeutic' aspects are also added to the composition – specific to what the individual's pulse indicates they might need according to Chinese Medicine therapeutic principles. I am not offering a 'medical' diagnosis of course. However, my soundscape compositions draw upon my experience as an acupuncturist in that I respond to and try to moderate imbalances I feel within participant's pulses. Each of my compositions aim to harmonise and rebalance the overall 'pitches' of the participant's zàng-fū networks in order to promote the health and well-being of each participant (Gao et al, 2010). The 'ideal' pitch of each of the zàng-fū, or the pitch at which the organ network ideally oscillates at and responds best to are as follows: Heart/Small Intestine [Zhǐ – Fire pitch: 399 Hz], Spleen/Stomach

¹³ Given the command, 'lSinOsc.ar(262.dup, mul: LfNoise2.kr(3, 3).max(0) * 0.009).play;' an explanation is as follows: lSinOsc is a sine wave sound object which is played back at the frequency of 262 Hz, this sine-wave is then shaped/modulated through a low frequency noise object (LfNoise), the pure sinewave (262) oscillation is then reinterpreted at the frequency control rate of 3 waves per cycle in both output channels 'kr(3, 3)' with an amplitude * 0.009. These synth objects: frequency, shape (created by the sound objects such as LfNoise, EnvGen, etc) and amplitude are the main constituents used to shape the sine waves.

[Gōng – Earth pitch: 264 Hz], Lung/Large Intestine [Shāng- Metal pitch: 295 Hz], Kidney/Bladder [Yŭ – Water pitch: 440 Hz], Liver/Gall Bladder [Jué/Jiao – Wood pitch: 350 Hz] (Gao et al, 2010). Selecting the appropriate pitches for each participant is based on my assessment of the specific and overall characteristics of the participant's pulse according to Chinese Pulse diagnostic theory.

Each composition is titled according to the diagnostic characteristic of their pulse. For example, a composition of a man in his mid-40's is titled as follows: 40's male. Yŭ Pulse. Yin Xu, Fine. Treatment Principal: Cool empty Fire, Tonify Yin, boost Yuán Qī. In this particular individual's reading (refer to Figure 12), a very thin and rapid quality was felt on the Kidney Yin position of the pulse. This 'weak' quality was contrasted by an overly strong, percussive and rapid quality felt from the Gallbladder position. To create a sonic composition that would 'harmonise' the overall pitches of the zàng-fū of this individual, the pulse impressions indicate that boosting the Water pitch, decreasing the Wood pitch and slowing the pace of entire the composition down would all be beneficial to this individual. The Water element with a pitch of 440 Hz was considered to be the most beneficial tone for the individual overall in



Figure 13: Sample of SuperCollider Reading_9 Composition. (2013) Screenshot. © Michelle Lewis-King.

this case and therefore forms the fundamental frequency for the tuning of the (Water/Yü) pentatonic scale of this composition. The pitches/frequencies of each organ-network within each composition are amplified or diminished order to balance the Five tones (refer to Figure 12 for an example). This particular composition adopts a Yin Yü scale to reiterate and enhance the overall yin¹⁴ aspect of the pulse, which was felt to be low.¹⁵

3.5 The instrumentation process of 'Pulse Project'

I use SuperCollider (SC) to instrumentalise my soundscapes into multi-channel installations as SC allows me to design each layer of sound, the directions they travel within a given space (i.e. the panning of sounds to and from particular speakers, etc.), assign pitches, tempos and define the shapes of the waves of each sound object. SC plays each composition by systematically evaluating lines of code. Each sound can be streamed by scheduling each line to be played at a certain time, for a certain duration, etc., by programming each line into an overall 'routine' or 'sequence'. The SC language sound object 'Routine' notifies the SC server to evaluate each line of code in a queue of sequential patterns, from top to bottom (see Figure 13 for an example of a standard routine). To give dimensional shape to the

¹⁴ Refer to the Glossary for this term.

¹⁵ For further reading on the relationship between Chinese Medicine, music and health, please see: http://www.acordnstitute.org/2010_6_2_live_zang_organ_harmonies_pitch.htm; and <http://www.thepointtimes.com/jn/24china/news/chinese-music-live-elements-5132.html>.

'body' of the composition (the body of the composition is in itself a description of a 'body' according to Chinese theory), each stream of sound can be routed (via program commands) to specific speakers within a multi-channel speaker system – creating an exterior embodiment of the interior rhythms of others.

4. Further thoughts on the sonic process of 'Pulse Project':

Everywhere where there is interaction between a place, a time and an expenditure of energy, there is rhythm. (Lefebvre, 2004, p. 15)

My transdisciplinary research aims to enact a practical analysis of an expanded sense of rhythmicity (through creating 'pulse' soundscapes) by bringing early Chinese medical technologies to inform and rethink contemporary Western artistic, digital and scientific practices and how they can be brought to work better together (Yu, 2003). As my research moves between several strata (i.e., the interpersonal relationship between oneself and others, across cultural practices, across time and disciplinary boundaries, etc.), my project also engages with the idea that composing each soundscape is an act of participation in and contribution to a larger always-emerging composition of ecological being and discourse – as an activity that maintains a connection with the gestalt unfolding of the world.

French philosopher Henri Lefebvre's *Rhythmanalysis* (2004) is particularly relevant to the manner in which my project constitutes



Figure 14: A Tibetan music score (N.D.) said to score 'experience'. Source: Fredrick Woodruff <http://www.fredrickwoodruff.com/post/74242777647/a-tibetan-musical-score-these-are-sublime-you>

a new approach to thinking about and producing works in sound. Lefebvre's *Rhythmanalysis* confirms the direction my project takes in its use of creative practice to form an analysis of scientific method, i.e., layering poetic speculation together with diagnostic speculation as means for contributing to and extending contemporary cross-disciplinary practices involving art and science. As Lefebvre remarks:

The rhythmanalyst will not be obliged to jump from the inside to the outside of observed bodies; he should come to listen to them as a whole and unify them by taking his own rhythms as a reference: by integrating the outside with the inside and vice versa.' ... It is not only in music that one produces perfect harmonies. The body produces a garland of rhythms, one could say a bouquet, though these words suggest an aesthetic arrangement, as if the artist nature had foreseen beauty – the harmony of the body (of bodies). (2004, p. 20)

Pulse Project brings together both imagined and phenomenal aspects of embodied sound appreciation and production and constitutes a divergent approach to sonic practice. Instead of trying to participate and contribute to a purely conceptual and exterior phenomenal world of digital and analogue sound, this study reverses the trend to focus on attention more on the interior world of sounds.

My artist-acupuncturist sonic practice enacts and extends Lefebvre's analysis of rhythmicity by recording and interpreting the interior rhythmic warps and wefts of the body and translating my analysis across art and science and form the interior of the body into exterior acoustic spaces. By using the human technologies of touch and creative interpretation as a form of diagnostic 'rhythmanalysis', it becomes possible to produce soundscapes capable of including the grounded human relationship between self and others and interior experience. As a practitioner who places my analysis between the biological, technical and the poetic, I extend Lefebvre's speculations on rhythmicity and analytic operation:

Often coupled empirically with speculations (see, for example, doctors in the field of auscultation, etc.), the analytic operation simultaneously discovers the multiplicity of rhythms and the uniqueness of particular rhythms (the heart, the kidneys, etc.). The rhythmanalysis here defined as a method and a theory pursues this time honoured labour in a systematic and theoretical manner, by bringing together very diverse practices and very different types of knowledge: medicine, history, climatology, cosmology, poetry (the poetic), etc.... he pursues an interdisciplinary approach. (Lefebvre, 2004, pp.16–22)

Pulse Project also uses Chinese pulse diagnostics together with performance and algorithmic programming to critique and widen the notion of the clinical encounter. It is precisely in using informed diagnostic touch, imaginative speculation and the mathematical logic of audio programming together that enables this project to perform a 'rhythmanalysis' in the manner that Lefebvre speculates on. The audio works of this study do not attempt nor claim to be a straight representation of the inside of the body from within the Cartesian logic of the 'cogito' (Lefebvre, 2004, p. 16) but uses Chinese medical and philosophical approaches to widen theoretical and practical discourse surrounding the body and embodiment. In resisting the representation of sound in 'realistic' technoscientific terms, this study also sonically explores the phenomenal and metaphysical interior and in-between spaces and processes of the body as a means to capture the more enigmatic 'inner' aspects of embodied reality than those currently being explored by technoscience or those acoustic ecologies which deny the co-

presence of the infrasonic ecology of the interior of the body with exterior sonic ecologies.

5. Summary

From the position of conducting artistic practice as a form of acupuncture inquiry, I am interested the physical, meditative, and interconnective aspects of constructing knowledge through performative duration, i.e., demonstrating knowledge through lived experience that is grounded and expressed through the body over time. To place emphasis on the body and temporal becomings is to make our experiences 'matter'. My compositions offer a way of visualising and listening to the emergence of others through the medium of touch – to be 'in touch' with others and the 'otherness' of the world – to celebrate the finite, indeterminate and unknowable passages and complex patterns of somatic experience that are folded into the gestalt becoming of the world.



Figure 15: Digital Notation Oakland 6 (2011). © Michella Lewis-King

My research and artistic practice also seeks to rethink the direction of new media and digital technologies by emphasizing that technological 'advances' should be brought into balance with (or made in accordance with) 'human' technologies – particularly the inner technologies of the body (of which diagnostic touch is just a small example of) that have been largely overlooked when we popularly speak of and conceptualise what 'technology' is and enacts. To formulate intelligent digital technologies, the human technologies of intuition, interpretation and creative expression should be thus incorporated. My compositions, drawings, notations, performances and encounters are steps in this direction, to call for and maintain a more ethical balance between the technologies of embodied experience and intercultural emergence with digital technology and technoscience.

Glossary

1. Processual – Defined online on Google's dictionary as: 'relating to or involving the study of processes rather than discrete events'.
2. Wú xíng – Often called the 'five phases' or elements (Earth, Fire, Metal, Water and Wood), this term describes a systematisation of phenomena into five distinct movements or phases. These phenomena could describe the movement and characteristics of the changing seasons of spring, summer and

so on. These elements have a specific relationship and order in relation to each other. One element may generate or control another, i.e., winter generates spring, whereas autumn is in contrast to spring. These elemental phenomena could describe the phasic interaction between cosmological entities or between the organs of the body as the early Chinese saw them (Rochat de la Vallée, 2009).

3. Yīn (yáng)–Yīn, whilst it tends to refer to phenomenal processes such as cooling, contracting, sinking, solidifying, storing, etc., it is not a separate entity in and of itself but is always considered in relation to its opposite – yáng. Yīnyang describe two opposing yet interdependent and interconnected primal forces that are characterised by such phenomena that are cyclical or on a spectrum, such as 'day and night', 'hot and cold', 'internal and external', etc. This continually shifting pair of opposites constitutes the fundamental basis for early Chinese philosophy and science – they also form the fundamental 'substances' of the body in Chinese medicine that describe a myriad of bodily processes (Sivin, 1995). For example, Liver 'Yáng' is the 'immaterial' energy expressed during a fit of anger while Liver 'Yīn' cools and subdues Liver 'Yáng' through storing the blood within the Liver Zàng, etc. (Sivin, 1995).

4. Zàng-fú – Zàng refers to the five yīn organs of the body: Heart/Pericardium, Spleen, Liver, Lung, Kidney. Fú refers to the six yáng organs: Large Intestine, Small Intestine, Gall Bladder, Urinary Bladder, Stomach, Triple Burner. These zàng-fú each have an associated channel that extends the energy of the organs along points across the body. As simple definition of the functions of the zàng-fú: the five yīn organs are said to 'store' and produce essential fluids, while the six yáng organs transform essences into production of movements/energy (Unschuld, 1986)

Figure 16: Images from the first *Pulse Project* performances in California in 2010




[Journal contents](#)
[Search](#)
[Search history](#)
[Archive](#)
[Vol. 6 \(2014\)](#)
[Vol. 5 \(2013\)](#)
[Vol. 4 \(2013\)](#)
[Vol. 3 \(2012\)](#)
[Vol. 2 \(2012\)](#)
[Vol. 1 \(2011\)](#)
[Index by author](#)
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TOUCHING AS LISTENING: PULSE PROJECT

Michelle Lewis-King

Abstract

Pulse Project (2011 -) is a performance series exploring the social interfaces between self and other, art and science, contemporary western music composition and traditional Chinese medicine. This performance-study series aims to interrogate the axioms that underpin contemporary medicine and digital technology through the exploration of its corollary "other" - traditional Chinese medicine and music theory - in order to generate a new approach to embodiment and soundscape composition.

[top](#)
[next](#)

Introduction

[top](#)
[next](#)
[previous](#)


Figure 1: *Pulse Reading 1* (2011) © Michelle Lewis-King. Photo: Barbara Butkus.

Through using pulse reading to programme bespoke soundscapes, *Pulse Project* positions the haptic and somatic into play with the digital. Drawing upon my experience as a clinical acupuncturist (with training in biomedicine), I use intuitive "active" touch together with traditional Chinese medical and musical theories and SuperCollider (SC), an open source real-time audio synthesis programming language, to compose bespoke algorithmic soundscapes expressive of the interior aspects of an individual's embodied being.

By employing the artist as a medium through which to conduct sonic art as "research," *Pulse Project* also provides a new method for synthesizing artistic, scientific and technological skill sets. Pulse "reading," case history, graphic notations and the programming of personalised soundscape compositions are all used as methods for extending the intimate possibilities within the social encounter between artist and audience.

The sonic works of this study are not simply sonifications of western principles of the circulatory system but offer another perspective from which to conceive of and listen to the interior spaces of the body. Pulse reading in the context of this study acts as an instrument of convergence between art and medicine, east and west, self and other. My approach counters recent trends within "interactive" sonic art which increasingly relies on heuristic measures of participant's vital signs, i.e., sonifying data from biosensors as the golden mean for representing the interior of the body and embodiment.

In order to determine the ways in which *Pulse Project* offers a new approach to the study and contextualisation of sound, I first outline a history of "listening" within the construct of the clinic in sections 1 and 2. Then following these sections, as my study takes the experience gained within a clinical setting into the public sphere, I outline *Pulse Project* in section 3. In section 4, I position *Pulse Project* within a contemporary framework of sonic research

by outlining artists working along similar lines with my study. In section 5, I discuss the themes presented throughout this article and compare the aims of *Pulse Project* in relation to other artists' works in order to make the case for why *Pulse Project* offers a unique approach to sound study in section 6.

1. Historical Underpinning of the Study

[top](#) [next](#) [previous](#)

In regards to the act of listening to the body of others within the contexts of modern medical encounter, a prescriptive relationship has been repeated continuously, with little change to the dynamic of the clinical encounter itself. The clinical consultation predominantly functions to assess a subject in relation to diagnosing and prognosticating possible pathological outcomes. According to Foucault, the "medical gaze" within the modern clinic privileges sight over other senses and serves to objectify the other. In *The Birth of the Clinic* (Foucault 1973), Foucault contends that within the sight/touch/hearing "sensorial triangulation" of "anatomy-clinical perception," its main emphasis "remains under the dominant sign of the visible" and that the diagnostic relationship is powered by the "triumph of the gaze that is represented by the autopsy: the ear and the hand are merely temporary" (Foucault 1973: 165). Given Foucault's anthropological account of medicine, what is significant in terms of this study is that the epistemic roots of modern clinical diagnosis and prognostication originate from the autopsies of the Enlightenment, particularly Descartes conception of the body as an assembly of mechanical processes (Vaccari 2012; Foucault 1973). From this point onwards, the discovery of anatomy has forever shaped the power relationship between doctor and patient as well as the scope of clinical inquiry in that they developed their stratagems of knowledge, measurement, diagnostics and intervention in relation to securing a rational/visual vantage over chaos and the pathological processes of death (Foucault 1973: 167). Furthermore, Foucault affirms that auscultation of the patient was developed under the auspices of the medical gaze, remarking that "the medical gaze is now endowed with a plurisensorial structure... that touches, hears and... sees" (Foucault 1973: 164). This "gaze," formed from the privileged vantage point of peering into the passive body via autopsy has since afforded the clinician an autonomous distance from the pathological threat of the patient's body (Foucault 1973). This approach to the body created the fundamental theatre that the modern clinical encounter continues to play out.

Though *Pulse Project* situates itself in the public domain, it is the intimacies and methodologies of the "clinical encounter" as a means for developing knowledge of others that provides the original context for this study. During my clinical training, I was taught to regard the "other" (patient) from the perspectives of two different rubrics simultaneously. One mode of experience was directed by the western model where the patient is assessed from a certain distance, within the lexicon of pathology. Whereas within the traditional Chinese medical model, the clinical relationship between the practitioner and the other (whom I consider the "querent") is less clear-cut and more intersubjective. The practitioner has a more intimate physical/emotional relationship with the other/querent and actively feels for subtle qualities within their pulse, palpates the "skin viscera," i.e., touches local sites along the body, along the "channels" as well as employing other clinical methods for gathering information (e.g., clinical questions regarding the querent's condition, emotional state, listening for certain sounds within the voice and body, associated smells, visual observations, etc). When compared with the occidental medical model, tactility features as the primary mode of relating and diagnosing in the clinic of the Chinese physician (Hsu 2005).

2. On Clinical Auscultation and Diagnostics

[top](#) [next](#) [previous](#)

With regards to auscultation practice within the western clinic, the dynamic of the medical gaze is echoed in the way in which instruments are used to "listen" to a patient's interior world. Scholar and musician Jonathan Sterne remarks on the clinical use of the stethoscope in his book *The Audible Past: Cultural Origins of Sound Reproduction* (Sterne 2003) that, "until the discovery of x-rays at the end of the 19th century, auscultation was the only available method for approaching the interiority of patient's bodies without physically cutting them up" (Sterne 2003: 123). He further asserts that, as Stanley Reiser argues, the stethoscope allowed the physician to "in a sense, autopsy the patient while still alive" (as cited in Reiser 1981: 36). This was "a strategy that makes sense only given the status of the autopsy in the acquisition of medical knowledge: while dead patients lay forever muted, their bodies could yield up immutable truth through the empiricist's skilful use of the scalpel. The body of the patient was a whole network of anatomo-pathological mappings" (Sterne 2003: 124).

Sterne states that the stethoscope introduced a modernity into the consultation, giving the physician a "clean" distance and autonomy from the patient, and goes on to remark that "the physicians' withdrawal from such person-

centered signs of illness was increased by the fact that the auscultation process required the physician to isolate himself in a world of sounds inaudible to the patient" (Stern 2003: 123) which facilitated the physician's reliance on methods which could "yield data independent from the opinions and appearance of the patient" (Stern 2003: 123). Foucault considers the stethoscope to exemplify "solidified distance" between the doctor and patient (Foucault 1973: 164). The very notion of "listening" to others in the context of the clinic becomes a form of listening that conforms to the "rules of method" (Latour 1987: 17). That is, that the data extracted from the patient is of superior import than the patient's subjective experiences when clinically composing a "picture" of the patient's condition.

Elisabeth Hsu writes in *Tactility and the Body in Early Chinese Medicine* (Hsu 2005), "If visual inspection of corpses was central to the development of anatomy in modern Europe, one may ask which of the senses was important for the emergence of the predominant currents of scholarly medical knowledge and practice in third- and second-century B.C.E. China? This article argues that it was tactile perception prompted by a tactile exploration of living bodies" (Hsu 2005: 7). From Hsu's reading of medical texts from the second century BCE, the *Mawangdui* medical texts and the *Huang Di nei jing* classic on medical difficulties, she states that "Chinese physicians of early dynastic times became interested in subtle changes that are not directly visible to the onlooker" (Hsu 2005: 12) and asks, "How can we explain their scientific interest in subtle, often invisible changes?" (Hsu 2005: 12). Hsu traces the approaches to which early Chinese physicians explored human ontology in both its physical and immaterial forms (which is what Hsu refers to when she mentions the "subtle and invisible changes" in the body). In regarding living phenomena, she illuminates Chinese physicians' "extensive tactile explorations" for understanding, measuring and debating the dynamics of interconnected (living) matter in motion and how this occurred within their subjects (Hsu 2005).

Chinese physicians thus developed a compendium of texts on the network of organs, vessels, and energetic pathways of the body. The texts describe detailed methodologies for both active and perceptive touch, i.e., lists for applying different types of touch as well as extensive accounts as to what the types of energetic expressions of each organ-vessel ideally should feel like (see Hsu 2005: 19-21). Early Chinese physicians' use of active touch to study the living body contrasts the importance placed on vision as the primary mode for observing the (dead) body in occidental medicine. By privileging visibility over tactility, occidental physicians of the Enlightenment created an objectifying and distancing approach to live phenomena that enabled them to banish that which could not be heuristically fixed, calculated and placed into a monistic tautology (Vaccari 2012). For this reason, Hsu argues that the tactile approach of Chinese physicians made them more sensitive to certain aspects of "human experience" than occidental medicine (Hsu 2005: 28). It is not my intention to set up a false binary argument between occidental and asian medicine, nor to give a flat portrayal of biomedicine in this article, as much of my critique already exists within the medical community (Broderick 2011).

3. Pulse Project

[top](#) [next](#) [previous](#)

Here I present *Pulse Project* which explores the tactility of Chinese pulse diagnostics of Elisabeth Hsu's study and posit it into the contemporary context of the sound study. This project investigates the use of intimate touch as a means for connecting with others and for producing embodied sounds that explore the intersubjective space/time between self and other. My study takes on the notion that the participants in the research are of equal importance to the researcher (Koski 2011). This examination explores the sonic possibilities of the interior of the body when considered from a perspective alternative to standard practice in western medicine and technology.

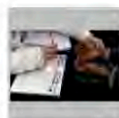


Figure 2: *Pulse Reading Detail* (2013) © Michelle Lewis-King, Photo: Nick Fudge.

Touch as Instrument of Convergence

In this study I enact sonic research through physically becoming an instrument or *medium* (in the sense of an alembic) between myself and others and between cultural traditions for understanding and mediating the body. As stated above, this study attempts to explore "touch" as an instrument between art and science, east and west, self and other. As medical anthropologist Elisabeth Hsu writes in, *Towards a science of touch, part I: Chinese pulse*

diagnostics in early modern Europe (Hsu 2000), in order to obtain research on tactility in relation to diagnostics or even a "science of touch" in the west, one must search backwards into pre-modern "psychophysics" (Hsu 2000: 251). The cessation of the development of a science of touch into the modern era was attributed to a problem of "subjectivity" and the blurring of subject and object through direct touch which was deemed unsuitable for "establishing a descriptive science" (Hsu 2000: 264).

In comparing the European pre-modern "science of touch" to traditional Chinese medicine texts and practices of pulse reading, Hsu establishes that (western) psycho-physicians kept within the lineage of Galenic medicine and conceived of a "two-point threshold task for mapping the different bodily sensibilities with respect to discrimination of sensation, localisation, temperature, and ... pain onto different skin regions" (Hsu 2000: 261). This determines that development of clinical touch in pre-modern Europe was determined by a flat or "passive" approach, confining itself to the surface of the skin instead of the more "active" and haptic types of tactile explorations recorded by early Chinese physicians in their detailed analyses of the patient's pulse qualities and other vibrations that stirred beneath the surface of the skin (Hsu 2000: 263).

In an attempt to bridge these ancient and pre-modern developments of a "science of touch" with contemporary praxis, I adopt an active touch with participants engaged in this study to obtain the signature characteristics and vibrations of each person's pulse. The "informed" touch I use is based on the lexicon of Chinese medicine pulse diagnostics which states that each (participant's) pulse contains a unique set of oscillating sound-waves and images, a complex set of twenty-eight + waveform images that correspond to mental and physical states of being. There are six positions and fifteen different levels at the wrist (see Figures 3 and 4) from which to take an impression (Flaws 1995: 19; Unschuld 1986), as opposed to the one position of modern biomedicine which simply measures heart rate.



Figure 3: *Chinese Pulse Positions* (2013) © Michelle Lewis-King.

Method

As demonstrated in Figure 3 above, the left and right wrists each have three positions where the practitioner's fingers are placed to palpate the pulse. Each position (indicated by the dark circles) registers at least two levels from which the pulse waveform qualities can be felt which are understood as "superficial" and "deep." These levels are also associated with organs and networks (see Figure 5). It must be noted that the organs discussed in this study are not equivalent to those in biomedicine (this is further elaborated on in the "Composition" section). For the purposes of differentiating the traditional Chinese conception of the organs from those of occidental medicine, Chinese "organs" are capitalised in this text.

Given the vast historical practice of Chinese medicine, Chinese pulse diagnostics affords practitioners a wide assemblage of methods and concepts from which to develop and train their palpation skills. The palpation of pulses requires many years of practice to develop the sensitivity to enable the practitioner to read pulses with accuracy (Hsu 1999). I began my training in 2002, and each instance deepens my understanding. So much so, that the study of the pulse waveforms of others has impelled me to take pulse reading from the hidden processes of clinical practice into the participatory and audio-visual realm of social art practice in order to develop Hsu's "science of touch" in a wider context.



Figure 4: *Nan Jing Pulse Classic Diagram* (2013) © Michelle Lewis-King.

In Figures 3 and 4 above, each of the black disks display the positions where pulse waveforms are palpated, interpreted and compiled together to produce an overall "portrait" unique to each participant.

Though the diagnostic approach to pulse taking is consistent in terms of where and how pulse investigation is

conducted, i.e., the positions of the fingers on the wrist, the ideal forms of wave-images for each organ-network, etc., there are multiple methods for pulse diagnosis in Chinese medicine. For example, according to the *Huang Di nei jing* (cited in section 3), each pulse has a position and depth at which it is ideally palpable (Adams 2006; Unschuld 1986: 117). For example, at one end of the spectrum, the Lung waveform is ideally palpable at the pressure level of three “beans” and at the other, the Kidney is ideally at the pressure level of fifteen “beans” (see Figure 4). If the wave-image expresses itself in the “wrong” place, i.e., at other levels than where it is ideally meant to be, this has significance as to the condition of the organ-network. For instance, if a percussive “bowstring” sensation, which ideally belongs to the register of Liver/Gall Bladder waveform expressions, can be felt at the level of 3 beans (which is at the level of the Lung/Large Intestine) instead of the location of 12 beans (the ideal level of the Liver/Gall Bladder pulse), this means a discordant relationship is developing between the Liver and Lung organ networks (Adams 2006: 26). Each of the organs and networks (known as *zàng-fǔ*) are also associated with an element, colour, tone, etc., which is further discussed in the “Composition” section below.



Figure 5: *Acupuncture chart from the Ming Dynasty: The Pericardium Meridian of Hand-Jueyin*. Ming Dynasty (1368–1644). Public Domain Attribution.

Performance Procedure and Recruitment



Figure 6: *Pulse Reading 2* (2013) © Michelle Lewis-King. Photo: Nick Fudge. Participants appear with consent.

The performance itself is staged in a public space using the simple props of a table, chair, note paper, ink, brushes, acetate, a laptop and a white coat. This performance is easily introduced into most public spaces (given proper permissions, etc.) and always attracts the attention of onlookers. In the interests of conducting my study ethically, those interested enough in the event are asked to review the participant information sheets before active participation in the performance study, circumventing any ethical issues. Participants' pulses are individually recorded and interpreted. The collection of data is modelled on a medical history or “case-study” basis. Clinical impressions of the pulse are first notated (see Figure 7), e.g., “bowstring,” “slippery,” “replete,” with the speed, vibratory qualities, fullness, emptiness, etc. Each organ-network (channel) is characterised and hand-drawn into a graphic notation. Each participant is given an individualised graphic notion during the performance and a SC soundscape file composed uniquely for them post-event (see Figure 8). The graphic notations and “clinical” notes are used post-performance to translate each person's pulse into algorithmic compositions of modulated sine waves using SC (refer to Figures 7, 8 and 9). The notations and compositions of each participant constitute individual samples of the overall research project which is archived online. *



Figure 7: *Clinical Notation 1* (2011) © Michelle Lewis-King. Photo: Barbara Butkus.

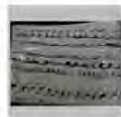


Figure 8: *V&A_1 Graphic Notation* (2013) © Michelle Lewis-King.



Figure 9: Leeds_3 SC Composition Code Sample (2013) © Michelle Lewis-King.

Composition

According to Chinese medicine theory, there are five *zàng* 臟 organs: the Heart (including the “Pericardium”), Spleen, Lungs, Kidneys and Liver; and six *fǔ* 腑 organs: Small Intestine, Large Intestine, Gall Bladder, Urinary Bladder, Stomach and Triple Heater. These organs have an associated energy reservoir or “network” (refer to Figure 5) that runs between the organ and the outer periphery of the body (Unschuld 1986: 408). This brings the total networks (or channels) to twelve when including the Pericardium. These twelve channels form the fundamental structural basis for my graphic notations and SuperCollider compositions.

The *zàng-fǔ* pairs are also each associated with the five elements: Fire, Earth, Metal, Water and Wood, and each element has a fundamental musical tone associated with it, i.e., Stomach/Spleen = Earth, Lung/Large Intestine = Metal, Kidney/Bladder, Water, Liver/Gall Bladder = Wood, Heart/Small Intestine = Fire, Triple Heater/Pericardium = “Ministerial” Fire. They are also associated with fundamental colours: Fire = Red, Earth = Yellow, Metal = Silver/White, Water = Indigo/Black, Wood = Green (Unschuld 1986: 256).

The frequencies I use in SC are calculated using the traditional Chinese pentatonic scale: *gōng* 宮, *shāng* 商, *jué* 角, *zhī* 徵, *yǔ* 羽, each of which represent the five tones of elements (Cheng-Yih 1995: 44-48). The fundamental tone, from which other tones of the scale are calculated, is related to the element which is most present in the participant. For instance, if the vibrations arriving from the Stomach position form the dominant feature of the pulse, then the tuning will be determined by the frequency that represents the Earth tone as the fundamental tone for the pentatonic scale (roughly 440 Hz, as this forms a “central” tone). The tuning calculation for the pentatonic scales can be seen here in Figure 10.



Figure 10: Chinese Music and Gamut and Scales. (2011) Joseph C.Y. Chen and Patrick Edwin Moran.

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My use of SC programming language (*sclang*) is basic, keeping to simple commands so I can intensify my focus on listening to and modulating the sine wave shapes, characteristics and amplitudes within each programming command in order to match the fluid and electric-like nature of the vibrations I feel within people's pulses. This is so as to match, with as much fidelity as possible, the vibrations appropriate to SC *ugen* (basic synthesis operators) commands. There is also an interpretative and intuitive element to reading peoples' pulses which is central to my composing a sonic “portrait” of others, and this allows me to place the “human” within the mechanical instead of the other way around, as a disruption of the *posthuman* turn in new media (refer to section 5 for further discussion).

For those unfamiliar with SC programming language, an example of the most basic command might be: “{SinOsc.ar(440, mul: 0.1)}.play;” and this simply tells the SC synthesis server (*scsynth*) to evaluate, expedite and match the code command with a sound object; or put more plainly, SC plays a sine wave at the frequency of 440 Hz at a moderate volume (Wilson et al. 2011). As stated above, in order to faithfully convey the landscape of the body according to Chinese Medicine pulse diagnostics, sine waves are carefully modulated to exemplify the signature qualities of pulse waveforms as described in the notations (as in Figures 7 and 8 above). For example, the command “{SinOsc.ar(440.dup, mul: LFNoise2.kr(4, 3).max(0) * 0.009)}.play;” corresponds to an aspect of a pulse emitting a “fine, slow, and irregular” oscillation along the “Spleen” channel. Each of the channels are associated with a colour (as mentioned in the Composition section) and this is represented in the colour-coded SC text below in Figure 11.

Figure 11: V&A_1 SC Composition Code Sample (2013) © Michelle Lewis-King.



As stated in the “Performance Procedure and Recruitment” section above, the clinical notes, drawings and graphic notations generated from the performance consultation are used to compose each SC command line so that the vibratory qualities of the drawn and painted lines associated with each channel can be rendered as faithfully as possible. Each line in SC represents a wave shape, speed, frequency and overall characteristic corresponding to each *zàng-fǔ* pair in the graphic notations in Figures 7 and 8 above. For example, in Figure 11, the top line corresponds to the graphic notation in Figure 7, which represents the Lung/Large Intestine paired organ-network, the second line in the notations and SC compositions represent the Stomach/Spleen pair, and so on. Also, each of these lines in the graphic notation essentially has two different quality expressions of sound oscillation in its relation to the *zàng-fǔ* pair (one sound is more “solid” and the other “lighter”). For example, the Large Intestine (*fǔ*) channel is represented by the silver coloured text in Figure 9 at 530.29 Hz, which has a lighter cadence and thinner wave sound quality than the Lung (*zàng*) oscillation (represented by the silver text further down at 530 Hz which has heavier and “rounder” characteristics).

Pulse Project Samples

In the audio files 1-8 below, each sample varies in amplitude as this reflects the strength or faintness of each pulse impression. Some soundscape samples are more layered, and therefore certain sounds will only be audible at certain volumes. Please use headphones and adjust volume to obtain the desired “full” sound.

Audio 1: V&A_1 (2013) © Michelle Lewis-King.

Audio 2: V&A_7 (2013) © Michelle Lewis-King.

Audio 3: Leeds_3 (2012) © Michelle Lewis-King.

Audio 4: Glasgow_7 (2012) © Michelle Lewis-King. Glasgow_7 (2012) © Michelle Lewis-King.

Audio 5: Leeds_6 (2012) © Michelle Lewis-King.

Audio 6: Leeds_7 (2012) © Michelle Lewis-King. Leeds_7 (2012) © Michelle Lewis-King.

Audio 7: Leeds_1 (2012) © Michelle Lewis-King.

Audio 8: Glasgow_1 (2012) © Michelle Lewis-King.

4. Soundings in the Field

[top](#) [next](#) [previous](#)

This section presents an introduction to contemporary artists and theorists whose research examines sound in terms of auscultation and listening to the interior of the body as a subject for sonic study, both in the contexts of the clinic as well as live performance, in order to establish a common field of practice for *Pulse Project*.

In his article *Listening as Touching and the Dangers of Intimacy* (Rice 2007), anthropologist Tom Rice presents his ethnographic study on the “soundscapes of the hospital” at St Thomas’s Hospital in London. Rice explores in detail the role played by the stethoscope in the healthcare practitioner-patient relationship and how this instrument creates an “acoustical engagement with the world.” Rice views the stethoscope as an object which creates an intimate and tactile form of listening or even as an object which can perform “listening as touch,” calling it an “auditory proboscis” (Rice 2007: 20). In this way the instrument becomes a probing bionic ear intensifying the act of listening. Rice argues that this form of listening is an active form of listening, enabling doctors to direct their (medical) intention via listening. Rice’s notion of “listening as touch” is discussed in relation to *Pulse Project*’s “touch as listening” in section 5 below.

Artist John Wynne has also conducted a study of auscultation in a hospital setting by listening to patients and creating sonic portraits of them at Harefield Hospital in London. Wynne’s sonic study, which formed part of the collaborative installation *Transplant* (Wynne and Wainwright 2010), has a similar approach to *Pulse Project* in that his field work involved building a rapport with transplant patients which he responds to by creating sonic “portraits” of them. Wynne shapes his soundscapes from the patient’s point of view and takes his material from within the environment they embody. His cacophonous array of sounds, such as monitor beeps, compressed air escaping from life-supporting machines, erratic metallic sounds of clinical instruments, the awkward shuffle of bodies coming and going and so forth, assemble together into an alarming soundscape interspersed with the sounds of patients’ voices recorded with such intimate fidelity that you can “hear the effects on their bodies of the illnesses within the grain of their voices” (Wynne 2010).

Artist-technologist Marco Donnarumma’s performance series *Music for Flesh II*, (Donnarumma 2012) explores terrain similar to *Pulse Project*’s use of sound as a means of amplifying a living dynamic of the interior of the body. The streams of embodied sounds in Donnarumma’s performances create a dramatic soundscape through “playing” the interior of his body while it is in motion. Donnarumma has developed an interface which uses biomedical engineering and informatics to amplify a wide range of muscle “sounds” (mechanomyogram or mmG) not audible to the “naked ear” (Donnarumma 2012). By using wearable XS biosensors sensitive to the biosignals of his muscle contractions and movements together with Pure Data (see Glossary), Donnarumma has created an instrument made of sensors and software that is able to map and play back the data streams triggered by biosignals (via biosensors) into a real-time cascade of unique sound shapes and effects which can sonically perform the “body” live, which he refers to as “Biomusic” (Donnarumma 2012).

Perhaps closest in approach to *Pulse Project's* use of sound to build an archive of the internal sonic landscapes of others is Christian Boltanski's installation, *Les Archives Du Cœur* (Boltanski 2008) where he makes an archive of the recordings of people's heart beats. Boltanski's project "might be described as Audio-Cryogenics. He is recording the heartbeats, together with factual details, of thousands of people which will be preserved in an archive in Japan, on the Island of Ejima. There, visitors will be able to commemorate their loved ones through the sounds of their living, beating hearts" (Levine 2012).

The artists listed above provide just a few examples of works that share aims and approaches similar to my study, however, it is where *Pulse Project* diverges from the direction of these works that will be articulated in the next section.

5. Discussion

[top](#) [next](#) [previous](#)

When comparing *Pulse Project's* emphasis on "touch as listening" with Tom Rice's ethnographic study on the clinical encounter and auscultation, *Listening as Touching* (Rice 2007), one of the issues that becomes apparent is that [or: what comes to the forefront is that] while Rice gives a compelling argument for the stethoscope as a "listening touch," Rice nevertheless adopts the paradigm of the dominant culture of the clinic as described in Foucault's critique of the clinic in section 1, whereas I try to navigate that relationship differently. By passively adopting the hegemonic dynamics of the clinic (Broderick 2011), Rice inadvertently perpetuates the distancing and mechanical mode of listening to others' bodies in a way that renders patients into passive objects of study. Rice states that the stethoscope directs the doctor's listening into an auditory proboscis that transmits the doctor's (medical) intention, thereby transforming the stethoscope into an "extra-ordinary" instrument of intimacy and listening. Rice's use of both the *intention* of the doctor and the *active* form of listening via stethoscope in his article uncannily echoes Hsu's writings about the active forms of touch in her article mentioned in section 1, *Towards a science of touch* (Hsu 2000), as well as her writing on *intention* as the Chinese physician's focused thought-projection of their healing "intention" channeled directly into the patient via touch in *The Transmission of Chinese Medicine* (Hsu 1999: 70). Rice's study, via a Promethean sleight of hand (Steigler 1998), places notions like Hsu's writings on these embodied methods and traditions for measurement and medical action via touch into the transcendental realm of the technological. Invariably the stethoscope stands in for and is considered as superior to both the human ear and touch in its ability to focus listening. This reiterates the idea that the body and its agency is improved through technological intervention. This notion, which can be traced back to Descartes, is also echoed in the *posthuman* turn surfacing in many works in new media that address the human-computer relationship (Vaccari 2012). Philosopher Andrés Vaccari writes comprehensively on the contemporary relationship between the body and technology in his article, *Dissolving Nature: How Descartes Made Us Posthuman* (Vaccari 2012) and argues that "with the body-automaton thesis, Descartes gestures towards the mathematization of physiology: the measurement, visualization and quantification of the body. Yet this fluid and busy assemblage of micro-biomachinery, by its very nature, escapes representation... The success of our representations is measured by their technological efficaciousness, rather than by how... successfully they fit reality" (Vaccari 2012: 168).

My use of "touch as listening" in *Pulse Project* is a critique and redirection of contemporary reliance on technology as the ideal representation of and improvement upon the human body and experience. While the "touch" in *Pulse Project* serves to form (by using the researcher as a medium) an intersubjective connection between the self and others as a means for listening intimately, the "touch" described in Rice's article legitimates the objective autonomy and aural authority the doctor has over the patient. Rice gives no account of the patient's experience (in fact they don't even exist as an entity in his article - which for me constitutes a form of non-listening and reiterates the power dynamics of the clinic) and places his emphasis on the notion of the "dangers" of intimacy in terms of touching and the transmission of disease from patient to patient (Rice 2007). This reiterates Foucault's description of the doctor using the stethoscope to distance himself from the threat of the patient in section 1. In building his argument, Rice cites Foucault's writing on the stethoscope as a "semi-tactile" instrument, thus developing his notion of tactility of the instrument, but neglects to mention Foucault's conception of the stethoscope as an object of "solidified distance," which is located in the same paragraph of Foucault's text as "semi-tactile" (Foucault 1973: 164). In this way Rice avoids Foucault's strong criticism of the stethoscope as a divisive instrument, keeping the doctor at a moral distance from the (pathological) state of his subject (Foucault 1973: 164).

Along similar lines, though John Wynne's sonic portraits present more of a challenge to the orthodoxy of the clinic by creating work that is patient-centered, nevertheless, both Rice's and Wynne's hospital soundscapes situate themselves within the prescribed dialectics of the stethoscope, which approaches the patient as a totality in stages of illness so that the main focus of the sounds is on their pathological expression. Wynne points out himself the

"illness in their voices" as significant, and through his omitting sonic details outside the pathological logic of the clinical scene, the morbid turn of Wynne's sonic portraits is palpable. Even Boltanski uses a computer, stethoscope and microphone (Demetriou 2010) to make his sonic archive of recorded human heartbeats which he uses as a memento mori for future visitors... the island where the archive is housed itself also functions as a "tomb."

In the increasing field of collaboration between artistic and medical practices, while it is undeniable that medicine and technology provide rich material for arts practices, the uncritical acceptance of the prevailing control-oriented culture of the clinic (Broderick 2011) by artists, theorists, etc., bypasses the necessary moral/ethical critique that the arts can offer medical practice (Koski 2011). Recent research suggests that through the moral and ethical forms of critique which art practice enacts, art can inform and therefore extend medical practice (Koski 2011). I refer to Kaisu Koski's findings on the role of artists working with medical themes or within the field of biomedicine: "the artist's task is not to offer solutions to biomedical dilemmas... arts practices can open a discursive space that can comment and critique the relationship between medicine and society" (Koski 2011). Koski also states that in the artist's public staging and performing of a critique of medicine by using "her emotional/corporeal experience," she opens up a more "holistic communication" with society (Koski 2011).

In answer to the question of how my sonic research might inform medicine and diagnostic practice, *Pulse Project's* wishes to provide an "alternative to the hegemony of the clinic" (Broderick 2011) by taking its critique of the clinic and placing it outside into the wider context of the public domain. Using (semi-diagnostic) touch to connect with participants, this reassuring presence instantly builds a mutual trust and rapport that no technical "instrument" could produce. This rapport is also part of my methodology, as my study engages with and includes the complex "presence" of participants within its approach to listening and composing. Touch in this study focuses on the tactile perception of oscillations of participants' pulses instead of using touch to prognosticate. In trying to listen deeply into the internal vibrations of others from the position of intuitive and corporeal experience, *Pulse Project* takes it sonic inquiry of the clinic and attempts to open it outwards towards the direction of lived experience. As mentioned in the introduction, *Pulse Project* soundscapes are not interpretative of the western notion of the circulatory system, but the project draws on Chinese medical philosophy to direct its sonic research into representing the body as a living cosmos pulsating with matter and energy. By placing my sonic research into a public setting where the emphasis is on engaging and developing a rapport with others in a live and intersubjective situation, this approach allows me to create unique sonic landscape portraits of human entanglement and complexity that does not go in the direction of memento mori or morbidity.

Lastly, it is important to mention that the artists discussed in this article are all male. This is not due to my neglect of the work of other women, but to the fact that conducting searches (at a local level, through literature and online) for artists working along similar lines in electronics and sound produced results that were almost exclusively white male artists and composers. According to composer Tara Rodgers, this is not a rare phenomenon, but a common problem for female and nonwhite composers, stating that even the terms technology and music are marked as white male territories and that these territories become even more exclusive of women and people with diverse ethnicity when these two fields are combined (Rodgers 2010: 2). I do not wish to disparage men in mentioning this, instead I intend to point out the extreme disparity of representation that exists between men and women in the fields music and sound. Rodgers argues that female composers offer a greater diversity of expression within computerised music/sound genres that is woefully underrepresented (Rodgers 2010). In conducting sonic research from feminist perspectives, *Pulse Project* aims to contribute towards the development of a new audio culture that extends the diversity and visibility of women's approaches to working with sound and technology (Rodgers 2010).

6. Conclusions

[top](#) [next](#) [previous](#)

This study seeks to provide a new means for producing and understanding sound relative to embodied experience. This study also offers an examination of the unique means with which sonic research can form a synthesis of different disciplines, e.g., medicine and art, eastern and western practices, etc., or be used as a relational tool (as with using touch as listening and sonic portraiture). *Pulse Project* questions the Cartesian notion of the body-as-machine through resisting a definition of the living body according to what it is "not" - that is from the perspective of a lineage informed by the primacy of vision and fixity of dissection that is framed by morbid process.

Pulse Project introduces a new method for touching and transposing sound that uses ancient and pre-modern approaches to the body to reconsider contemporary practices. Through my sonic portraiture, I attempt to convey my findings on the "living" body. As human touch bridges self with other, the development of a science of touch based on the model of early Chinese pulse diagnostics is being used in this study to challenge and widen contemporary medical and technological discourse. This method for touching sound (or touching as listening)

attempts to create sonic expressions that are faithful to the complexities and mysteries of human experience and existence. Instead of creating another human/machine interface which is “interactive” and “user-focused” (thus mediating participation), this study publicly explores direct participation through using the creation of intimacy between the artist and audience as a context for conducting sonic research. As a response to the participant offering themselves to be read, the graphic notations and bespoke compositions are given freely as “gift” to exist as a unique form of visual and sonic portraiture of the participant, as an aesthetic document of the intimate, and temporally significant, encounter between practitioner and participant.

* An archive of “anonymised” SC compositions of participants can be accessed on [soundcloud](#).

Glossary

[top](#) [next](#) [previous](#)

Shāng diào scale - an early Chinese pentatonic scale tuning method using the note shāng as the fundamental tone. (Cheng-Yih 1995)

Zàng-fū - Zàng refers to the five yin organs of the body: Heart/Pericardium, Spleen, Liver, Lung, Kidney. Fū refers to the six yáng organs: Large Intestine, Small Intestine, Gall Bladder, Urinary Bladder, Stomach, Triple Burner. These zàng-fū each have an associated channel that extends the energy of the organs along points across the body. As simple definition of the functions of the zàng-fū: the five yin organs are said to “store” and produce essential fluids, while the six yáng organs transform essences into production of movements/energy.

ScLang - SuperCollider programming language which uses an object-oriented and functional language syntax similar to C programming language. (Wilson et al. 2011)

Scsynth - SuperCollider synthesis server which supports multiple input and output channels and uses a “bus system” to match programming commands with sound objects. (Wilson et al. 2011)

Ugen - A unit generator which is an argument structure of arrays and values for functions or classes used in building audio synthesis objects and signal processing algorithms. (Wilson et al. 2011)

Pure Data - a real-time graphical programming environment for audio, video, and graphical processing developed by Miller Puckette. (Di Liscia n.d.)

References

[top](#) [next](#) [previous](#)

Adams, Joseph (2006). “Bringing the Nan Jing to Life. Pulse Taking and Diagnostics from the Classic of Difficulties.” *American Acupuncturist* 35: 25-27.

Boltanski, Christian (2008). *Les Archives Du Cœur*. Permanent Installation Managed by The Fukutake Foundation. Teshima, Japan: Teshima Art Museum.

Broderick, Sheelagh (2011). “Arts practices in unreasonable doubt? Reflections and understandings of arts practices in healthcare contexts.” *Arts & Health*, 3(2), 95-109. Retrieved April 10th, 2013, from <http://www.tandfonline.com/doi/pdf/10.1080/17533015.2010.551716>

Cheng-Yih, Chen (1995). *Early Chinese Work in Natural Science: A Re-examination of the Physics of Motion, Acoustics, Astronomy and Scientific Thoughts*. Hong Kong: Hong Kong University Press.

Demetriou, Danielle (2010). “Boltanski’s Hearts Don’t Skip a Beat.” *The Japan Times* August 6th. Retrieved April 1st, 2013, from <http://www.japantimes.co.jp/culture/2010/08/06/arts/boltanskis-hearts-dont-skip-a-beat/#.UWwA3St2528>

Di Liscia, Oscar Pablo (n.d.). “Pure Data.” *puredata.info*. Retrieved April 11th, 2013, from <http://puredata.info/>

Donnarumma, Marco (2012). “Incarnated Sound in Music for Flesh II. Defining gesture in biologically informed musical performance.” *Leonardo Electronic Almanac* 18(3): 164-175.

Flaws, Bob (1995). *The Secret of Chinese Pulse Diagnosis*. Boulder, CO: Blue Poppy Press.

Foucault, Michel (1973). *The Birth of the Clinic: An archaeology of medical perception*. (trans. A. M. Sheridan). London: Tavistock Publications.

Hsu, Elisabeth (2005). “Tactility and the Body in Early Chinese Medicine.” *Science in Context*. 18(1): 7-34.

Hsu, Elisabeth (1999). *The Transmission of Chinese Medicine*. Cambridge: Cambridge University Press.

Appendix III

Pulse Project Research Outputs 2011 – 2016

Selected Residencies and Awards:

2015 -16	Pulse Project Performances hosted by: Pulse Project residency at:	PROJECT ANYWHERE, International. 4DSOUND Studios, Budapest, Hungary. September.
2014	Collaborative Hackathon event	The Port at CERN, Geneva, Switzerland. October - November.
2013	Carousel Sound Lab Funded Residency. UK Finalist. Artist-Investigator Project.	Milton Keynes Art Centre, Artworks MK, November. The Triangle Lab. San Francisco, CA. February.

Broadcasts:

2015	Pulse Project: January 31st.	Resonance FM, London.
2014	Sound Art Show: April 27th.	BCB Radio 106.6 FM, Bradford.

Publications:

- **Technoetic Arts: A Journal of Speculative Research, Intellect.** 'Pulse Project: A Sonic Investigation Across Bodies, Cultures and Technologies (in press).
- **ISEA 2016 Cultural R<evolution Proceedings.** 'Touch as Techne: Pulse Reading as Interface': https://isea2016.scm.cityu.edu.hk/openconf/modules/request.php?module=oc_program&action=view.php&id=356&type=4&a= .
- **The Acupuncturist (A British Acupuncture Council Publication).** 'Touching as Listening.' Issue 9, Winter, 2016, pp.22-23.
- **Digital Creativity. Routledge: Taylor and Francis.** 'Touch as Techne: Rethinking Digitality'. Vol. 26 No. 1. April 2015.
- **ELSE Journal for Artistic Research.** Issue 0. 'Touching as Listening: A Translational Encounter Between Art, Science, East, West, Self and Other.' November, 2014.
- **Reflections on Process in Sound. Issue 3 .** 'Pulse Project: An Investigation Across Bodies, Cultures and Technology". September, 2014. Online Journal: <http://www.reflections-on-process-in-sound.net/issue-3/>
- **Trans-What? 2013 Conference Proceedings.** 'Pulse Project'. Transart Institute, Berlin. January 2014. <http://www.transart.org/trans-what/2014/01/22/lewis-king-pulse-project/>
- **Clang.** WAVE. [Digital Album]. 'Ryoko, Leeds, 4, 2013' is Included in this compilation album. Copenhagen, Denmark. July 2014.
- **Clang. Pulse Landscapes.** [Digital EP]. Copenhagen, Denmark. November 2013.
- **SAE 2013 Conference Proceedings.** 'Pulse Project: Towards a New Ecology of Embodied Sounds'. University of Kent. November 2013.
- **Digital Art Forum. 'Re-new Digital Arts Festival Conference Proceedings 2013'**, pp.80-84 (ISSN 2245-7801). 'Pulse Project: A Critical Encounter Between Art, Science, East, West, Self, Other'. Copenhagen. DK. November. 2013.
- **Journal of Sonic Studies.** Issue 4. 'Touching as Listening: Pulse Project'. Leiden University Press, Leiden: Netherlands. June 2013.
- **Convergence, Engagement & Power: Proceedings of the 6th Annual PhD Conference at the Institute of Communications Studies.** De Beukelaer, C., Pothong, K., Schindler, C., Nothias, T., Shaw, S., Abd. Karim, N., and Miguel, C., eds.. Leeds: University of Leeds. pp. 23-27. "Creative Futures: A Critical Survey of Contemporary Interfaces as the Construction of Ubiquitous Marketing'. July. 2013

Press Bibliography:

- **Heise Online: Make,** 'Festival STWST48 – Kritische Information und Desinformation in 48,' Stunden' Amina Lehner. Linz, Austria. September 9th, 2015.
- **Anglia Ruskin University.** 'Visualise: Making Art in Context.' Bronac Ferran Editor, 2013, pp. 6-7.

- **Bulletin**, 'First Annual CoDE conference Takes Place in Cambridge,' 9(5), pp. 6. May 2012.
- **Visualisecambridge**, 'Fluxing the Manifesto,' Review. Available at: www.visualisecambridge.org/?cat=10>. Feb 2012.

Conferences Presentations:

2016	ISEA 2016 Cultural R>evolution Paper: 'Touch as Techne: Pulse Reading as Interface' Artist Talk: 'Pulse Project: A Sonic Investigation'	Hong Kong City University, China May
2015	Consciousness Reframed 2015 Paper: 'Zheng as Intercultural Consciousness' Science and You. Paper: 'Touch as Techne'	Detao-Node, Detao Masters Academy, Shanghai, China. Nov. Université de Lorraine, Nancy, France. June.
2014	Le Sujet Digital III: Temporalités Paper: 'Touch and Techné' and Panel Discussion. Performing Philosophies of Effort/Gongfu. Paper and Performance: 'Pulse' Project'. Leonardo Arts Science Evening Rendezvous (LASER). Paper and Performance: 'Pulse Project'.	Archives Nationales, Université Paris VIII. November. Shanghai Theatre Academy, China. July. Central Saint Martins College, London. May.
2013	Seeing Sound: A Practice-Led Research Symposium. Paper: 'Pulse Project: Touching, Seeing and Listening to Sound'. Flossie 2013: Women and Software Libre. Paper: 'SuperCollider and Performance Research: Pulse Project' SAE 2013: Symposium on Acoustic Ecology. Paper: 'Pulse Project: Towards an Ecology of Embodied Sounds' Re-New 2013 Digital Arts Festival. Paper: 'Pulse Project: A Critical Encounter Between Art, Science, East, West, Self and Other'. Noises of Art: Audiovisual Practice in History, Theory, and Culture. The School of Art, Aberystwyth University, Wales, and the Courtauld Institute of Art, London. Paper: 'Touching as Listening: Pulse Project'. September. Trans-What? Transartfest Art Biennial. Paper: 'Touching as Listening: Pulse Project'. August. Participation: A MeCCSA Postgraduate Conference. Paper: 'Complexity in Practice: Art, Science, and the Social'.	Bath Spa University. Bath. Nov. Queen Mary, University College London. November. University of Kent, School of Music and Art. November. PB43, Copenhagen, Denmark. October. The Transart Institute, Berlin.
2012:	Prospectives '12: International Festival of Digital Art. Paper: 'The Creatives: A Critical Survey of Contemporary Interfaces'. October. Live Interfaces: Performance, Art, Music. Contributor to panel discussion on 'Liveness and Interfaces'. September. Convergence, Engagement & Power: The 6th Annual ICS PhD Conference. Paper: 'Transparencies: A Critical Survey of Contemporary "Interfaces"', May.	Anglia Ruskin University, Cambridge. April. University of Reno, Nevada, USA. ISCRiM, University of Leeds. September. University of Leeds.

Workshops:

Zheng as Interface

An intercultural series of workshops and lectures exploring contemporary Chinese attitudes to the practice of 'Traditional' Chinese Medicine
Pulse Project.

A pulse reading and SuperCollider workshop.

Re-New 2013 Digital Arts Festival.

A pulse reading and graphic notation workshop.

Pulse Project.

A pulse reading and graphic notation workshop.

The Litmus Test.

An art-science themed discussion on Pulse Project.

Roy Ascott Studios: DeTao Masters
Academy Shanghai Institute of Visual
Arts, China. November 24th, 2015.

STWST. *Station Messschiff Eleonore*,
Linz, Austria, September. 2015

PB43, Copenhagen, Denmark.

November 2013.

University of Huddersfield.

April 2013.

The Gallery Cafe, Bethnal Green,
London. July 2013.

Solo Shows:

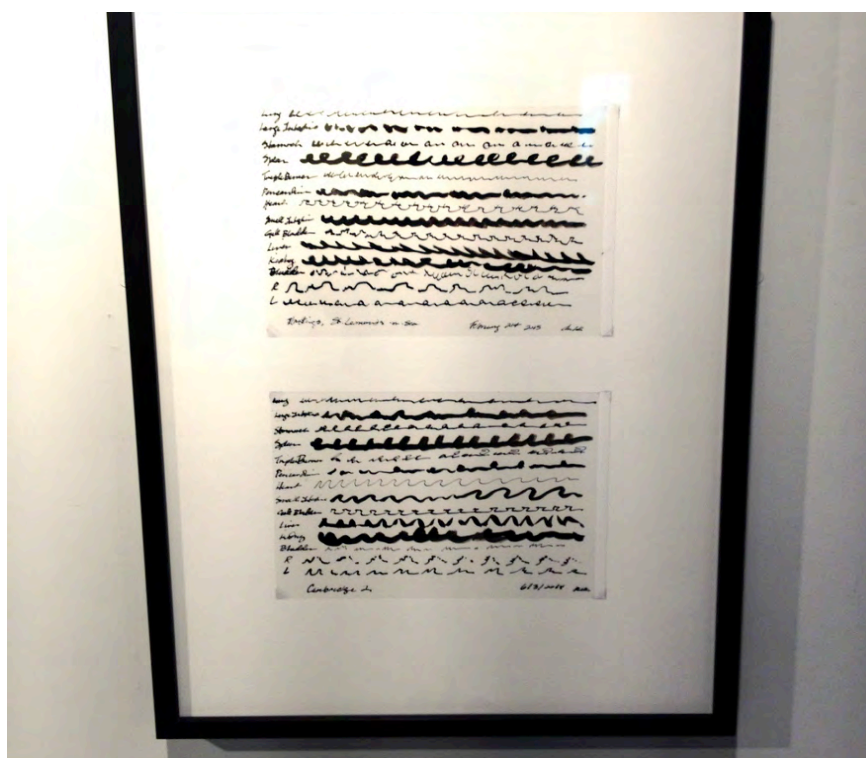
2014	Pulse Project.	The Gallery, Antenna Space, Shanghai. September
Selected Group Exhibitions:		
2016	ISEA 2016 (performance)	Hong Kong City University, China. May 18-21.
2015	Circadian at TodaysArt 2015 NL 48 Hours INFO DETOX (in association with Ars Electronica) Pulse Project on location at the 56th Venice Biennale Drawing Towards Sound (with John Cage, Cornelius Cardew, Pierre Boulez, Aura Satz et al.) Cerebellum: London - Hastings.	Electriciteifabriek, Den Haag, Nederland. September 23-27th <i>Station Messchiff Eleonore, Linz, Austria.</i> September 3-6. Palazzo Contarini della Porta di Ferro, Venice, Italy. May 6th Stephen Lawrence Gallery, University of Greenwich, London. April The Stags Head, London and Rock House Art School, Hastings. April Anatomy Museum, King's College, London. Ex-Teresa Modern Art Museum, México.
2014	Chinese Art Festival: Show, But Also Tell. <i>Disjointed: Digital Culture.</i>	
2013	Hardcore Software: Beta Release Launch. Re-New 2013 Digital Arts Festival. Pulse: Tones of the Orient. JAM 2013: The Body and the Digital Digital Futures.	The White Building, London. Dec. PB43, Copenhagen, Denmark. Nov. Phipps Hall, University of Huddersfield. April. Main Hall, University of Reading. April Victoria and Albert Museum, London. February
2012	Artist's Games. Live Interfaces: Performance, Art, Music Spaces of (Dis)location. Channeling Interference. Future Fluxus.	Spike Island Gallery, Bristol. Oct. ICSRiM, University of Leeds. Sept. Gillmorehill Centre, University of Glasgow. May. Regent Studios, London. April.
2011	Experimental Notations.	Ruskin Gallery, Cambridge. Feb. Royal Nonesuch Gallery, Oakland and Mission Creek Music and Art Festival, San Francisco, CA.

Appendix IV

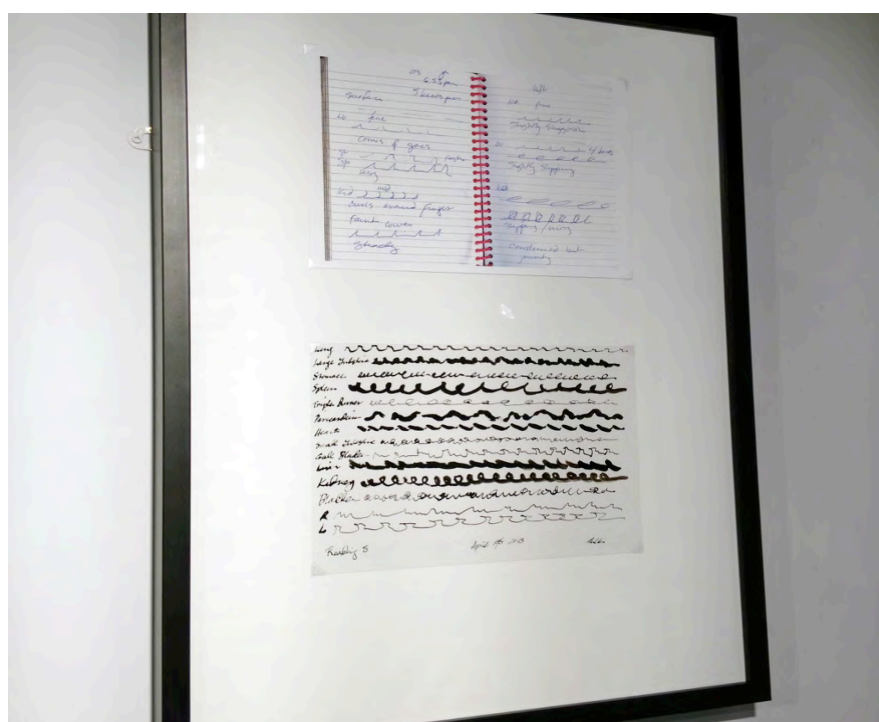
The following are photographic documents of artworks produced for this research that have been included in various exhibitions.



Doc. 1: *Drawing Towards Sound* (2015), curated by David Ryan [installation detail], inc. work from far left of image: *St. Leonards-on-Sea 2* and *St. Leonards-on-Sea 5* (2015) [Michelle Lewis-King]. Stephen Lawrence Gallery. University of Greenwich, London. Note paper, acetate, ink. Photo: Léna Lewis-King.



Doc 2: *St. Leonards-on-Sea 2* (2015) © Michelle Lewis-King [detail]. In: *Drawing Towards Sound* (2015), curated David Ryan. Stephen Lawrence Gallery. University of Greenwich, London. Acetate, ink. Photo: Léna Lewis-King.



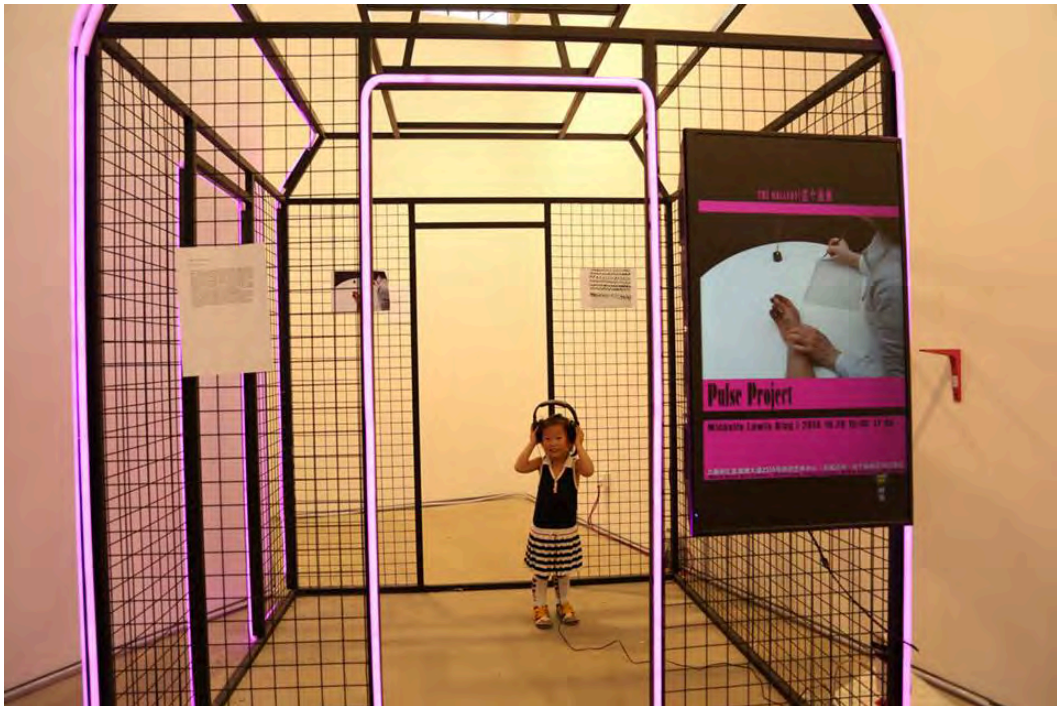
Doc 3: *St. Leonards-on-Sea 5* (2015) © Michelle Lewis-King [detail]. In: *Drawing Towards Sound* (2015), curated David Ryan. Stephen Lawrence Gallery. University of Greenwich, London. Note paper, Acetate, ink. Photo: Léna Lewis-King.



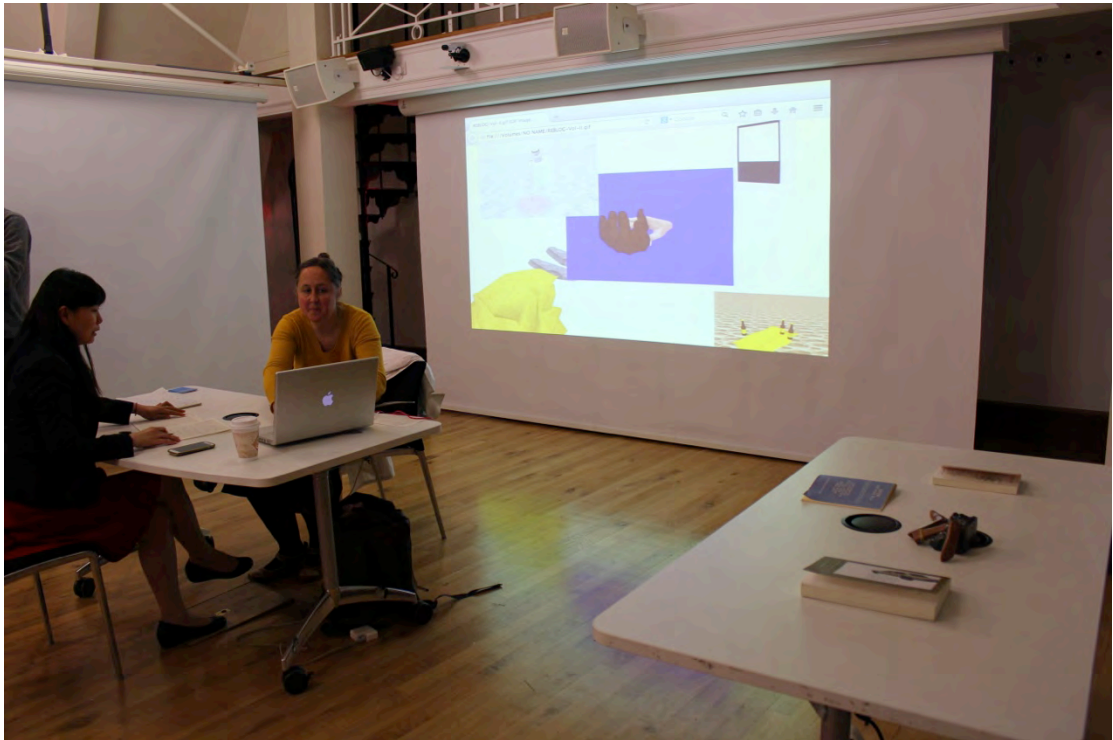
Doc 4: *Pulse Project* [solo show] (2015), curated by Wang Xin [poster]. Poster: Wang Xin.



Doc 5: *Pulse Project* [solo show] (2015), curated by Wang Xin [installation detail] © Michelle Lewis-King. The Gallery, West Bund Art Space, Shanghai, China. Photo: Wang Xin. Notations, Soundscapes [Mp3 players].



Doc. 5: *Pulse Project* [solo show] (2015), curated by Wang Xin [installation detail] © Michelle Lewis-King. The Gallery, West Bund Art Space, Shanghai, China. Photo: Wang Xin. Notations, Soundscapes [Mp3 players].



Doc. 6: *Pulse Project* [installation view] (2014) © Michelle Lewis-King. In: *Show But Also Tell* (2014), curated by Bridie Hindle. Anatomy Museum, Kings College, London. Photo: Leah Clemens.



Doc. 7: *Pulse Project* (2014) [performance view], © Michelle Lewis-King. In: *Show But Also Tell* (2014), curated by Bridie Hindle. Anatomy Museum, Kings College, London. Photo: Leah Clemens.



Doc. 8: *Pulse Project Notations and Soundscapes* (2013) [installation view], © Michelle Lewis-King. In: *Disjointed Culture* (2014), curated by Javier Calderon, Ex-Teresa Museum, México City. Photo: Javier Calderon.



Doc. 9: *Pulse Project Notations and Soundscapes* (2013) [installation view], © Michelle Lewis-King. In: *Disjointed Culture* (2014), curated by Javier Calderon. Ex-Teresa Museum, México City. Photo: Javier Calderon.



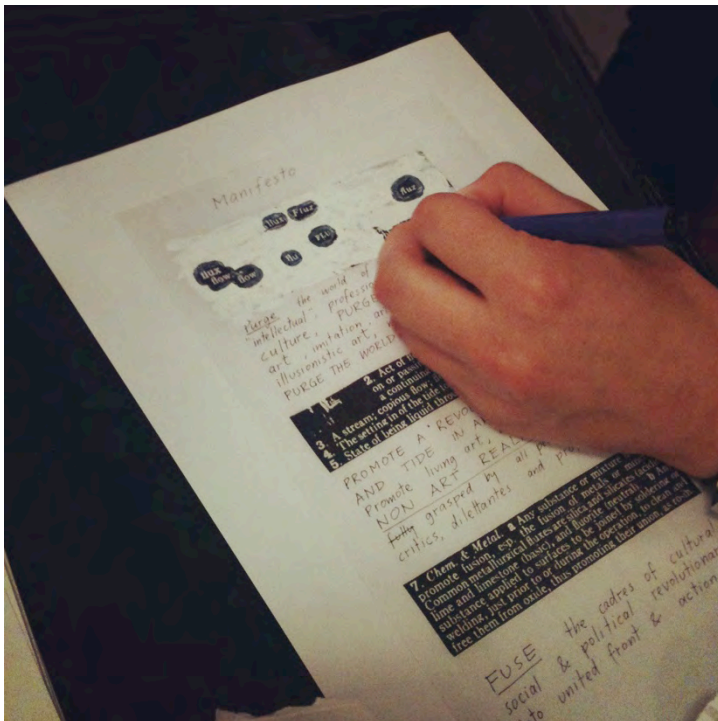
Doc. 9: *Pulse Project* (2013) [performance view], © Michelle Lewis-King. In: *Hardcore Software: Beta Launch* (2013), curated by Rachel Falconer and Lawrence Lek. White Building, London. Photo: Rachel Falconer.



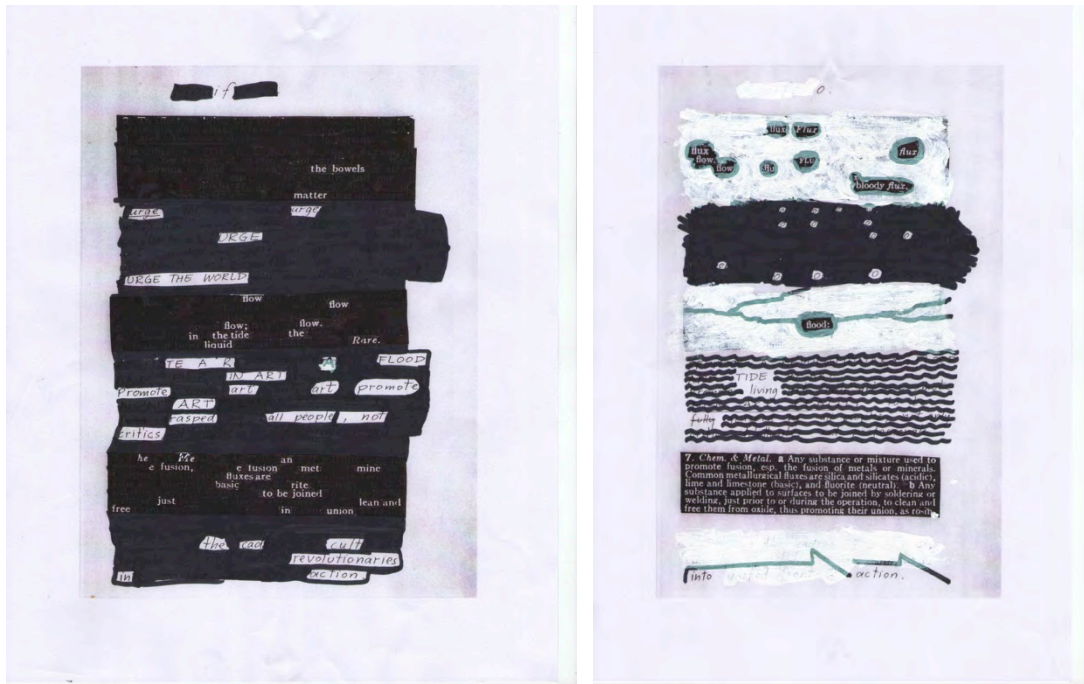
Doc. 10: *Pulse Project* (2013) [performance view], © Michelle Lewis-King. In: *Digital Futures* (2013), curated by Irini Papadimitriou. Victoria and Albert Museum, London. Photo: Nick Fudge.



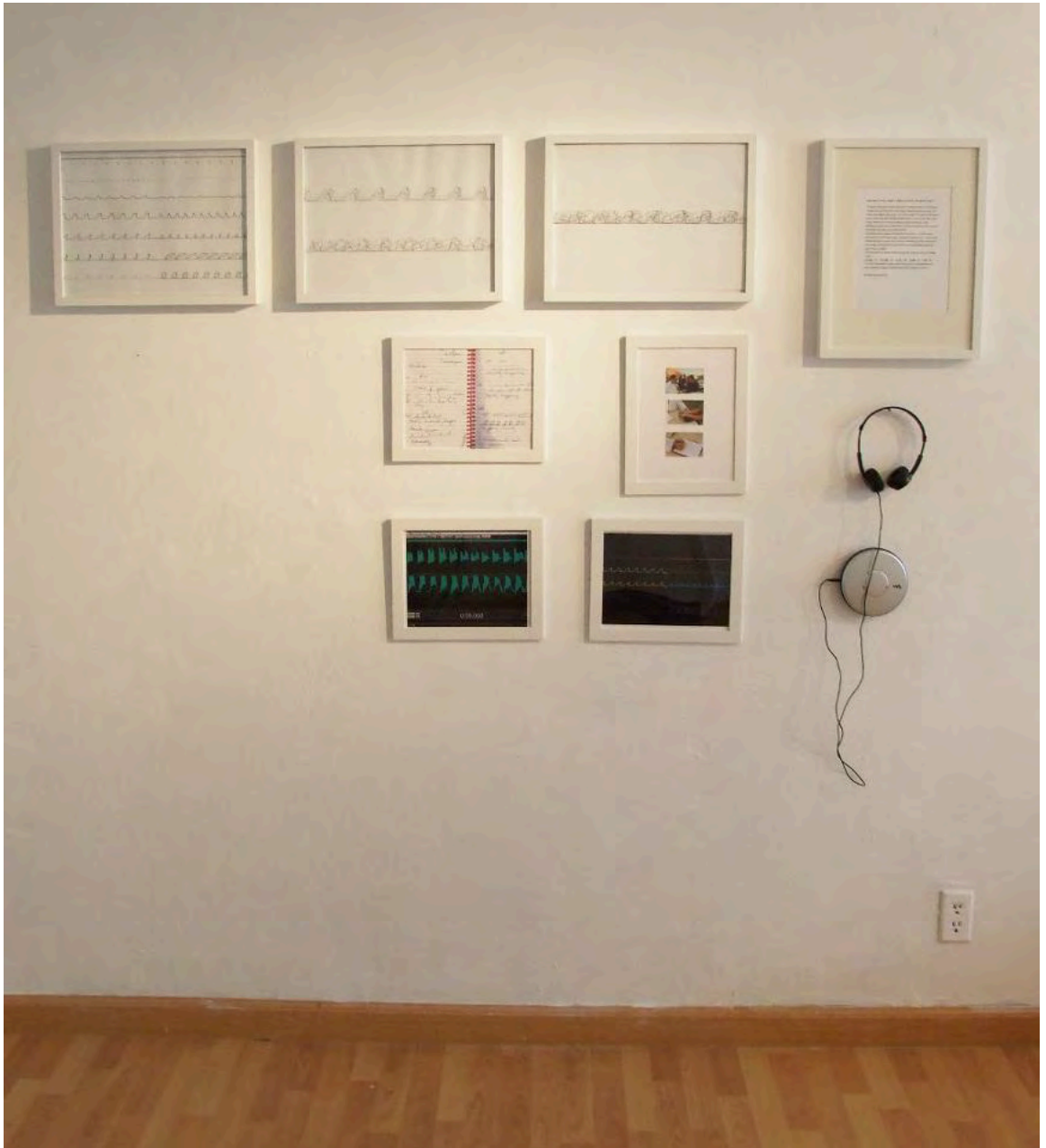
Doc. 11: *Participatory Notations – Flux Off (2012)* [games event view], © Michelle Lewis-King. In: *Artist Games (2012)*, curated by Anna Searle of 'the collect.' Spike Island, Bristol. Photo: Anna Searle.



Doc. 12: *Participatory Notations – Flux Off (2012)* [participation detail] participant work, © Michelle Lewis-King. In: *Artist Games (2012)*, curated by Anna Searle of 'the collect.' Spike Island, Bristol. Photo: Anna Searle.



Doc. 13: *Flux Off - Participatory Notations* – (2012) [participation detail] participants' work, © Michelle Lewis-King. In: *Artist Games* (2012), curated by Anna Searle of 'the collect.' Spike Island, Bristol. Photo: Anna Searle.



Doc. 14: *Pulse Project* (2011), [installation view]. In: *Experimental Notations* (2011), curated by Jeff Ray. Royal Nonesuch Gallery, Oakland, CA. Soundscapes [CD player], digital notations and clinical notations. Photo: Philip King.

Appendix V

Ethics Proposal

Proposal for Pulse Performance Study:

Project Aims:

This project explores the current relationship between art and science through attempting to reconcile the process of scientific research with art processes, as well as explore relational possibilities between a contemporary artist and their 'public' through conducting art as 'research'.

Pulse Project also aims to demonstrate through reading a person's pulse the possible ways in which 'art-as-research' can respond uniquely to the unique individuals who participate. Using human touch and digital technology together, Pulse Project will explore expressions of the invisible and interior aspects of bodily experience.

Note:

This proposed performance study is not central to my PhD project - being a small aspect of my PhD project exploring the phenomenon of 'Pulse' - but this study would add the 'human touch' element to my Digital Humanities and fine art research.

Although art performance practice does not fall strictly within a social or clinical science discipline, there are obviously many ethical areas to consider. The difference in approach scientific research takes towards a 'participant' to that of an art researcher engaging with an audience through live collaborative 'participation' shows the research gap between art and science approaches and their attendant social functions and this designates the territory of my research.

A Gap in Research:

Having conducted a literature review into performance art practice, audience participation and research ethics, I found very little research material connecting these fields together (besides sample Participant Information Sheets from various universities), exposing a need for the creation of research methods bridging these disciplines.

As this study is in its very early stages and constitutes a relatively grey area between science and fine arts research practices, I consider applying to and receiving feedback from the Ethics Committee as essential part of the process of creating a new methodologies between art and science approaches towards research 'participants.' As a practicing artist who has had experience with scientific research processes, it is my wish to be enabled to preserve the creativity and spontaneity essential to art practice research while ensuring my project is rigorous and ethically grounded.

Proposed 'Research' Performance:

In Chinese Medicine, pulses emit wave-like frequencies that are unique to each person. Taking a person's pulse involves a reading of 9 positions on each wrist - instead of just one as with biomedicine. A practitioner records and interprets each pulse as an 'image' that reflects a person's interior 'landscape'.

I would 'collect' pulses of consenting public members (over 18) - for a maximum of ten minutes each person, with a maximum of six participants. Participants are free to opt out at any time. Participant pulses will be interpreted via a Chinese Medical Pulse Diagnostic model (pulses felt will correspond to a 'pulse image') but no diagnosis will be made. Data will instead strictly be used to make visual and audio works (please refer to accompanying PDFs).

For Data Collection and Analysis, Inclusion/Exclusion Criteria, Procedures to be Carried Out, Potential Risks and Solutions, Security of Participant Data, please refer to the Ethics Application enclosed with this proposal.

Recruitment -

By ad:

In consultation with the Ethics Committee and my supervisor, I would create an ad to be posted in selected art and science journals inviting people to participate in the study (location and date yet to be determined). The ad would conform to the requirements and 'house style' of the publications it is submitted into and would be an edited version of the Participant Information Sheet enclosed with this application (please refer to this document for the following text) and would include: project aims, invitation, inclusion and exclusion criteria, a clear description of what the project involves, its duration, who is conducting the research, and contact details. When persons contact me for more information I would send them a Participant Information Sheet that would cover the project in more depth. The Consent Form will be signed in my presence.

By public invitation as a performance - briefing and debriefing:

I will invite random members of the public who fulfil inclusion criteria requirements to participate in an 'art study' in return for a free art work (to be completed and sent to participants post-event). I would give each person a Participant Information Sheet, and require they read it thoroughly before we started and then would check their understanding of what they had read and then after asking them if they still wanted to proceed I would ask them to sign a consent form (of which they would retain a copy of).

Location and set up:

This is yet to be determined. Ideally, I will set up a stall with two chairs, a small table and a wrist cushion in a safe and comfortable public location (subject to logistics - UK public codes and permissions) - an 'art fair' or cultural event would be ideal as people attending tend to be more familiar with performance so consent might be more likely and informed. Security would also be heightened ensuring researcher/participant safety.

Researcher/ Participant Well Being:

Participants will be well informed by being given a Participant Information Sheet after they respond to the ad or public invitation clearly explaining what the project is, what will happen, what their role is, the inclusion/ exclusion criteria, what will happen to their information (please refer to the Participant Information Sheet and the Ethics Approval Application for details) and I would also make sure the participant felt at ease to discuss any questions they might have. There will be a clear and visible sign on the table will show a disclaimer stating the study is in not in any way a medical procedure or diagnosis and that all participant info will be made anonymous during the event as well as in the completed work, ensuring participant privacy. Participants can opt out at any time. My performance will be monitored by another person, as this would ensure my safety from potential harm as well as a means to check/improve my performance.

Accompanying PDF Contents:

- a) Images of collated data as composition (images of participant 'notes')
- b) An image of a music score/track example of a sonic interpretation of a participant's pulse.

Description to aid images: 9 possible position readings are taken from each wrist. The data is first transposed into individual sounds (18 position readings in all) and then are mixed down/super-imposed into two tracks resembling a faithful rendering or 'pulse image' (the right side and the left side) of a participant's pulse at the given time and location.

Appendix VI



**Anglia Ruskin
University**

Cambridge & Chelmsford

Cambridge Campus

East Road
Cambridge
CB1 1PT

T: 0845 271 3333
Int: +44 (0)1223 363271
www.anglia.ac.uk

PARTICIPANT INFORMATION SHEET

Research Title:

Pulse Project: A Public Performance

Aims of the Research:

This project explores the current relationship between art and science through making the process of scientific research into a work of art. This project also aims to explore new relationship possibilities between a contemporary artist and the 'public' through conducting art as 'research'.

Pulse Project also aims to demonstrate through reading a person's pulse the possible ways in which art-as-research can respond uniquely to the unique individuals who participate.

Using human touch and digital technology together, Pulse Project will explore expressions of the invisible and interior aspects of bodily experience. Through taking people's pulses, the artist will interpret each individual's pulse as unique set of sound-waves and images, using digital technology as a means to reflect the artist's interpretations and document the moment of contact between the artist and participant.

Invitation:

You are being asked to participate directly with an artist in the process of making an artwork, you yourself will become a part of the 'art'. This performance art study will respond to you, should you decided to participate, by giving you in return for your

participation, an artistic interpretation of your own unique pulse - you will receive an artwork of your pulse, which will also exist as a document of your participation.

Who Can Participate:

Members of the public who are fit and well (persons with no physical or mental health issues), between the ages of 18 and 70 (or children up to 18 with parent's consent signature).

Exclusions Explained:

In the interests of maintaining this performance study as 'low risk', ensuring both the safety and well-being of participants and the researcher, the researcher has decided to restrict participants to the above criteria.

Who Is Conducting this Performance Art Research:

Michelle Lewis-King, PhD Research Student

Anglia Ruskin University, East Road, Cambridge, CB1 1PT

What this Project Involves:

The 'artist' researcher will be seated at a small table to the left-hand side of the main foyer in the Helmore Building. The table will have a small red cushion for you to rest your wrist on, a notebook for taking notes and a sheet of paper for your email address. If you agree to take part, you will seat yourself opposite the art-researcher and place your wrist on the cushion (first the left wrist then the right).

Duration of the Project:

The reading of each wrist can take up to five minutes each - totalling ten minutes of your participation. The art researcher will take artistic notes of her impression of your pulse.

What Happens After You Participate:

After you complete your participation, the art researcher will contact you, informing you how long you might expect to wait to receive your personal artwork.

Your Confidentiality and Anonymity:

The notebook the art-researcher uses in the study will be used **ONLY** for making drawings and taking artistic impressions of your pulse. No personal information about you besides your age and gender will be taken.

Each participant's emails will be taken on separate sheets of paper that will be hidden from view and kept strictly confidential.

Sheets containing participants' emails will be shredded after participants receive their artwork.

Your Autonomy:

As a participant, please know that you are free to leave at ANY time during the pulse taking.

Important Notes:

This project study is NOT a medical diagnosis.

Published Outcomes of the Research:

The artist has the right to retain her artistic interpretation of your pulse as being exclusively her intellectual property and will maintain unrestricted use of your interpreted pulse (which will be made anonymous and unidentifiable as 'yours') in future public exhibitions, online and in published material.

Associated Risks:

As this study takes place in a public location, you may feel on display, be vulnerable to passing comments from other public members and you may potentially risk your personal safety by being 'visible' - as you would be taking part in something noticeable to other public members and inviting unwanted attention. Please consider these personal risks before consenting to this study. Agreement to participate in this research will not compromise your legal rights should something go wrong.

Risks Addressed:

This project will take place in a public location deemed safe, with either a security guard in attendance (i.e., the Helmore Building, etc.), or another researcher will be present to ensure both the researcher's and the participant's personal safety.

Please feel free to contact me if you have any questions or require further information:

Michelle Lewis-King

CoDE PhD Candidate

Anglia Ruskin University

East Road, Cambridge, CB1 1PT

Phone: 07703834199

michelle.lewis-king@student.anglia.ac.uk

Should you feel you have any concerns or wish to make a complaint, please contact the researcher first to resolve the issue. If for some reason this cannot be done, please contact:

Postal address: Office of the Secretary and Clerk, Anglia Ruskin University, Bishop Hall Lane, Chelmsford, Essex, CM1 1SQ

Email: complaints@anglia.ac.uk

Emails will be acknowledged immediately and a response will be given within five working days.

Letters will be responded to within five working days of receipt.

YOU WILL BE GIVEN A COPY OF THIS TO KEEP,

TOGETHER WITH A COPY OF YOUR CONSENT FORM

Appendix VII

Participant Questionnaire

The standard feedback questions:

Please feel free to be as honest as possible.

Your answers can be as brief or as long as you see fit.

1. What were your thoughts regarding the performance encounter (the pulse reading)?
2. What are your immediate impressions of this soundscape?
3. If you listen to the soundscape over a few days or weeks, do you feel any noticeable difference in how you 'feel' or a change in perception when you play the soundscape? Please describe if so.
4. What else might you like to feedback to me about the performance, this composition and or the process of this work (inclusive of the time it takes to receive your soundscape)?
5. Please feel free to make any comments you feel these questions do not cover.

Appendix VIII

Pulse Project 2011-2015 Participant Feedback Log

Key:

This information is collated from email correspondences, which are available on request. Participants are identified by the event name and an assigned number. My commentary is in maroon text. The '+' means positive feedback, '/' means neutral feedback and '-' means negative feedback.

1. Central Saint Martins 1 (female). Event Date: May 19, 2014

Initial feedback: June 23, 2014 +

'I absolutely love it, WOW! I have awesome speakers with a big subwoofer, so I played it very loud last night, it's just amazing, thank you so much for doing this! I have put in on my iPod so I can listen to it, it's so calming and interesting.'

Follow-up Feedback: February 20, 2015 +

'My thoughts regarding the performance encounter was exciting and interesting to me after hearing some soundscapes from other readings. I enjoyed how each pulse was different and how it made a different movement in the drawings.

After receiving my soundscape it made me feel very peaceful, which is the opposite of what my pulses were doing. I am a workaholic and get stressed very easily doing too much, so this soundscape gives me a moment of peace and tranquillity with myself and my thoughts, it's almost like what I would imagine a baby could hear inside the womb, all their mothers pulses of their organs at once and at different paces each time. It was a great experience and an interesting outcome.'

2. Kings' College 2 (female). Event Date: May 9, 2014

Initial Feedback: July 21, 2014 +

'Yes, surely I remember that I took part of your performance several months ago. It was really an impressive and wonderful experience for me. And i very [much] like the diagram you draw for my pulse. I am very excited and happy to receive the composition you made for my pulse. I will write your feedback soon after I go back to my studio and finish listening with headphone.'

Follow-up Feedback:

No direct response to the soundscape - but this participant invited me to exhibit my soundscapes in an exhibition in China in September 2014.

3. King's College 5 (female). Event Date: May 9, 2014 *Initial Feedback:* May 14, 2014 + 'Looking forward to the analyse of my pulse, exciting~~' *Follow-up Feedback:* July 21, 2014 + 'Wow I check the sound, it is amazing!!'

4. White Building 3 (female). Event date: December 5, 2013

Initial Feedback: March 11, 2014 +

'Huge thanks for giving me chance to be a part of your interesting performance. The fact that I can now listen my pulse in a totally different way is just amazing!

As for the feedback, I didn't know much about the method you use for reading the pulse and transforming it into sound but I found this process especially interesting because of using coding to get the results. As we are on the edge of trans/post/humanist era, I think "reading" and "listening" human body and transforming it by using computer algorithms is inevitable. It proves that we are not anymore purely biological species (or we can even argue that we've never been) and this process leads us to see ourselves as a species extended with or into artificial tools. Moreover, not every biological process taking place in our bodies is fully explained and understood even in 'sophisticated' western medicine, so maybe searching for the new unconventional methods like you do leads us to understand our own species in a totally different way. Although pulse reading has long history and today it gives us lot of information about functioning some of our internal organs, your method is an amazing way to hear it in a way we never did. What amazes me best in this project is that for me it's more about artistic and creative approach than about its biological and medical aspects, transforming pulse's nature from what we knew and heard to something what we had no idea it could sound like, from beat to ambient music. And it makes me think that my body has not only rhythm but also it's own, unique melody.'

5. Copenhagen 1 (female). Event Date: November 1, 2013 *Initial Feedback:* November 6, 2013 + (Performance Feedback)

'I remembered how you said the day before that people liked to be touched and I was looking forward to seeing how I would react to this. I am not a particularly "touchy" person, but generally, in appropriate contexts, I like being touched. Strangely, in my case, it needs to come first from others. Sometimes being touched is also scary to me, cause it seems to be without limits (in my researches, I work with the idea that touching blurs the distinctions between self and others). In terms of culture, I come from a mixed one that is both Nordic and Latin, hence we give kisses and touch but not too much and only with very good friends, and it seems to be more accepted among women.

But the experience made me think further. There is something liberating about being touched, about communicating without words or visuals. Words can fuck up meanings. Touching seems to me to be more direct; there is actually no need for meanings, just a feeling of being connected.

I felt like it was easier to transmit buried emotions or histories that way, because they remained subconscious, there was no need to articulate (or de-articulate) them. It reminded me of the one time I've had a Thai-yoga massage. I couldn't stop crying.

But we can't escape words and the explanations you provided were very helpful in the experience. I also needed to understand what was happening, as I am right now unfolding the experience, again, in words. I guess that it needs to be a feedback loop between words and body.

Your insights about my pulse(s) were very interesting. I know I need to take more care of myself and the importance of rest, but can't help pushing myself forward because I am passionate. I guess I need to find a balance. I really enjoyed the experience. Many thanks and I look forward to listening to my track.'

Follow-up Feedback: February 5, 2014 +
(Soundtrack Feedback)

1. What are your immediate impressions of this soundscape?

Urgency, obsession, perseverance, concentration, achievement, magic.

2. Do you identify with this soundscape in any way? If so and/or if not, what is your experience?

Yes especially that I listened to it after a long day of evening of thesis writing

Before I started replying to your email, just a couple of minutes ago, I listened to your composition again, many times over, and here's what I pitched on a sheet, interestingly in French (translated here, but I hadn't written in that language in a while!):

Blood runs in my veins like the backwash of tides, waves are brushing the sand (translation note: or lapping the sand, can't seem to find appropriate translation for *frôler*, which is a way of touching delicately, from the tip of the fingers for instance) second after second, day after day.

The water wants to escape, but remains there, trapped inside.

A contained strength, ready to spring, to pierce.

The water spins in circles (*tourne sur elle-même*)

The water that goes through a turbine and produces an electric current.

The water that morphs into a spark.

Also, I am truly fascinated by the image that you saw from taking my pulse: the interior fire that I carry forward, at the forefront of my being. I was very touched by that image, as I believe it represents me so well. I feel like I have to constantly remind myself of my own boundaries otherwise I might fall into the world and into others.

Please keep me updated on your research, I find it fascinating.

6. Copenhagen 2 (male). Event Date: November 1, 2013 *Initial Feedback*: December 19, 2013 **No Response**.

Follow-up Feedback (after two reminders): March 2, 2014 -

1. The performance encounter was an interesting meeting, but also a little stilted. Because of your non-authoritative demeanour, I wasn't sure whether the performance was grounded in irony and humour, or serious academic work. The experience itself was intriguing in a great way, but it was difficult for me to comprehend the goal or idea behind it all.

2. The soundscape is a lovely piece with some great tones, but I wonder if I am to read it as a diagnosis or a musical piece. If a diagnosis, then I do not have the sufficient knowledge to read it.

3. I do not – it does not connect with me, because of its factual basis. The lack of structure or melody denies any emotional involvement with it.

4 I think the strength in this performance was the issues about what is and what is not a diagnosis and what is or is not art. The soundscape itself seems like an afterthought, and not as impressive a result as the drawing itself. The drawing gave the participant an immediate representation of a novel experience – an art object created out of a pseudo-scientific experiment. With time, the memory fades, so the soundscape seems removed from the original experience of the performance.

7. Copenhagen 3 (male). Event Date: November 1, 2013

Initial Feedback: February 8, 2014 +

'I've just had a quick/cursory listen and my first impressions are that I feel really at home with it! I'll send you some more thoughts (and maybe even some questions) when I've had a proper listen later on.'

Follow-up Feedback (after two reminders):

No response.

8. Copenhagen 9 (male composer). Event Date: November 1, 2013

Initial Response: January 2014

'Thanks for this, I will take a look at it over the next days.'

Follow-up Response (after 3 reminders): January 25, 2015

'Your explanation in "// Soundscape as Prescription: This composition..." I found a very rewarding read! The comments on the choices that you made for synthesizing your readings was interesting, and I tried to transfer some of the code to max, as it seems to be summed sine waves with amplitude modulation? See attached screendump, but I could not immediately discern how the development over time was handled by the code.

Although I find it entirely credible that our body emits waveforms, I had several issues with the referenced texts, on the whole because they do not seem sufficiently knowledgeable about music when referencing it. For instance, the emotions related to the five pitches in "Chinese Music's Five Elements, Five Tones" are not all musical emotions (but the text description is indeed so, albeit other musical emotions).

The second article "Five Zang-organs Harmonize Pitch: Modern research and clinical treatment of the lost theory and technology in Huang Di Nei Jing." has issues with the technical terminology of sound (the use of 'frequency' when what is meant is 'spectrum') and how they relate to music (pitch as a complex of harmonious frequencies is not equivalent to music in itself; a musical scale is not a pitch, but a set of pitches as a mode on that pitch). The section on the 25 pitches is also ambiguous, but later it becomes clear that what is meant is a subdivision of the octave into 25 steps.

Our vocal chords are coloured by the vocal tract to form spectral peaks (formants) in the range from 240 to 2.400Hz. It is intuitively clear that our voice's sound changes with our health (and mental state), and it seems natural that a diagnosis can be made from this.

The experiment described in the same paper does not identify the ten words used, so I cannot know if the vowels' formants (spectral peaks). There may be an interesting relationship to the five pitches, even though at least two peaks is needed to discern a vowel. It is also not clear to me at what step of the process the voice takes on the tonality of the Zang organs. But this does not mean that I do not find it credible, just that I do not find that the paper is clear in reporting on the experiment.

I searched the web a bit on Zang-fu organs and sound without finding much, so your work is for sure very welcome!



9. Reading 7 (male - digital artist). Event Date: April 19, 2013

Initial Feedback: February 7, 2014 +

'I think that participating in your pulse project was the most interesting part of the conference. I'd be really interested in seeing/hearing what you managed to interpret from my readings.'

Follow-up Feedback (after 2 reminders):

No response

10. Leeds 5 (female - composer). Event Date: September 7, 2012

Initial Feedback: February 7, 2013 +

What I felt in the conference, difference between most of all others and you, is the presence of humanity without total detachment from what we are (which I detect from a lot from past artists, including Cage, Feldman, Tudor, Toru Takemitsu, etc.). I inquired into your performance because I wondered 'can you actually find something about me?' The answer you gave me was nothing more than the truth of my body, which was quite a surprise. Not because I do not normally believe the way humans can interact and understand by touching, but because I just had not expected to have such conversation at the technology conference.

This participant liked the performance and the research very much and requested to work on a collaborative project entitled *PULSE* that was carried out in April 29th 2013. See the section entitled 'Collaborations' in Chapter Four.

Follow-up Feedback (after three reminders): March 11, 2013 +

'I enjoyed the piece from Leeds. It was too short though. I want it longer!!!! I was gonna make a [sound] piece with it. I wanted to send you a [sound] piece and surprise you as a present but it never happened...'

11. Leeds 3 (male - composer). Event Date: September 7, 2012

Initial Feedback: September 19, 2012

Thanks for the file - plays fine on my mac, and do contact me again.

Follow-up Feedback (after one reminder): February 20, 2014 / +

As you say, it was a long time ago...

1. I was interested in the idea. It's not exactly giving blood, but there was something intriguing about giving my pulse to a project. There's an odd distance between the giving and the function/use value, as we had to wait for the transcription into sound.

2. I like the crackle on the surface; I find the irregular layers hard to follow as the sounds are pretty pure (i.e. have few harmonics)

3. I've listened to it a few times and I find I want to listen in more to the cross-rhythms/irregularity.

4. Why is it so short? Is that the length of time you took the pulse? (I can't remember)

It has an out of time quality, which is reminiscent of minimal music (crudely Glass-like sound world and Reich-like phasing) so feels like it needs to be longer. That of course depends on what you intend it to be. You call it a soundscape, but it has many 'musical' surface features; should I be listening with musical ears? or should I be listening with a different kind of (temporal) objectivity trying to reference the pulse-taking? Is it for me, or for public consumption? You've released it on Clang... there (though what you write for a release is maybe different from your original intention...) you call them algorithmic compositions. That has a particular effect on how I might then listen (musically). Reich's phasing pieces are algorithmic too, though I associate 'algorithmic' with something more mechanical (the fact that you choose to describe the work that way, where Reich would not, influences the way I listen, whether you intend that or not).

In contrast, "acoustic ecology of embodied soundscapes that convey the unique sonic spaces hidden within each person" and "the body as a living cosmos pulsating with matter and energy." seem more poetic and for me more interesting.

The only thing that jumps out at me is "Instead of using SuperCollider to create logical musical arguments (as is standard), " - what is a "logical musical argument"! There's a very long (centuries, millennia...) history of 'musical argument' stemming from numbers, concepts and mysticism in our own and other cultures...

These questions gave me a lot to consider in terms of what I mean about listening and also about logic. My response to these questions and remarks are discussed in the opening part of the section entitled 'Sound Composition as a Healing Modality' in Chapter Four.

12. Glasgow 7 (female - dancer). Event Date: May 25, 2012

Initial Feedback: June 6, 2012 +

Thanks for taking my pulse at ... last week. I look forward to receiving your sound/image file!

Follow-up Feedback (after two reminders): February 11, 2014

'I have only just listened to the soundscape of my pulse again after all this time and I continue to find it absolutely fascinating.

1. What were your thoughts regarding the performance encounter (the pulse reading)?

It felt very mysterious, as if you were reading an invisible, unknown aspect of my self.

2. What are your immediate impressions of this soundscape?

When you first sent me the soundscape I was struck by the regularity of the sound - it gave me the impression of a very stable, if not very vital, force.

3. If you listen to the soundscape over a few days or weeks, do you feel any noticeable difference in how you 'feel' or a change in perception when you play the soundscape?

Please describe if so.

The second time (i.e., now) I listened to it, it sounds more alive to me - which is reassuring. But I understand you have actually given an extended version of the original recording, so it is probably different anyway. Also, I wasn't feeling well around the time you took the pulse, but am better now, and so my perception is probably altered.

4. What else might you like to feedback to me about the performance, this composition and or the process of this work (inclusive of the time it takes to receive your soundscape)?

I couldn't play the download on my pc (windows media player said it couldn't read the file) but I was able to read it on the link to the label you sent me.

5. Please feel free to make any comments you feel these questions do not cover.

I am involved in sound and art installations and currently working on translating poetry into movement and dance. These soundscapes are very powerful and I would love to choreograph something with them.

Also, I am intrigued by the level, sustained pulses (a bit like morse code!) that punctuate the background sounds on all the recordings. Can you give me a little more information on what these represent?'

I responded by explaining the composition process in more details to this participant

13. Glasgow 12 (female - teacher). Event Date: May 25, 2012

Initial Feedback: June 25, 2012 +

'Sounds really cool! Thanks. Looking forward to hearing the whole piece with the visuals.'⁴³⁹

Follow-up Feedback (**after 2 reminders**): September 29, 2014

'Sorry for my late reply.

1. What were your thoughts regarding the performance encounter (the pulse reading)?

I thought it was very interesting and it was fun to participate in a creative activity.

2. What are your immediate impressions of this soundscape?

I thought it was beautiful

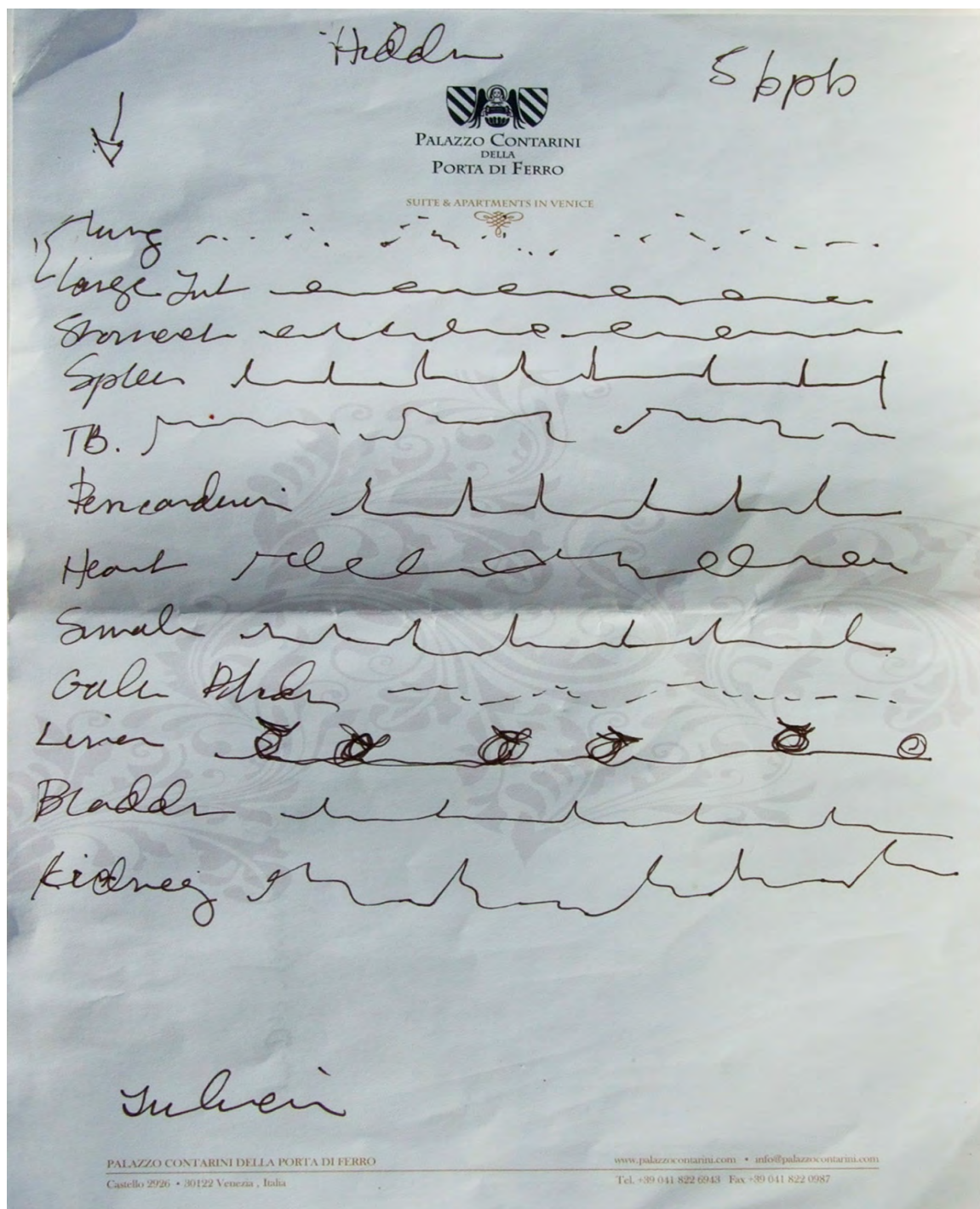
3. If you listen to the soundscape over a few days or weeks, do you feel any noticeable difference in how you 'feel' or a change in perception when you play the soundscape? I listened to it a while back. I don't think I noticed any difference.'

⁴³⁹ In the early stages of this project, I didn't give participants their notations and it took a long time to compose each soundscape, so I amended this for the following performances, e.g., that participants be given something as a document of the performance.

Appendix IX

Details of *Pulse Project* Notations:

I present a selection of Pulse notations that reflect the variety of pulse reading interpretations.



Doc. 1: *Palazzo Contorini 1* (2015), *Pulse Project* at the Venice Biennale. [notation/ document] © Michelle Lewis-King. Palazzo Stationary, Ink. Photo: Léna Lewis-King.

48 bph


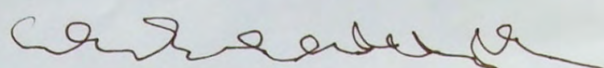
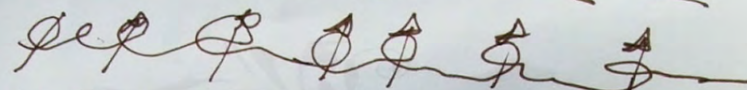
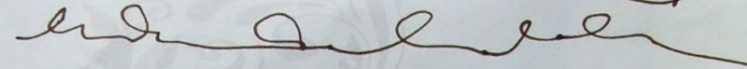
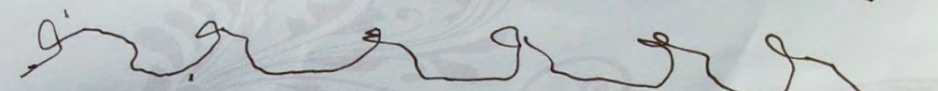

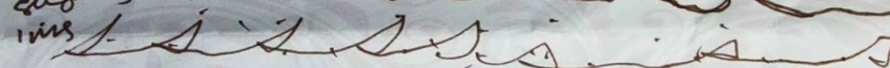
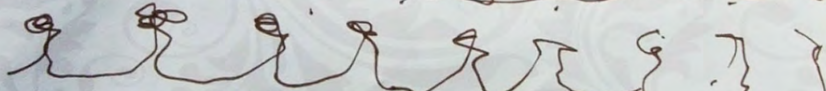
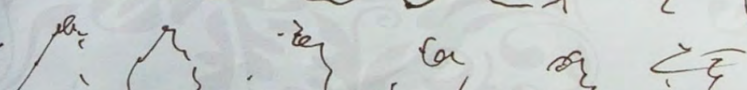

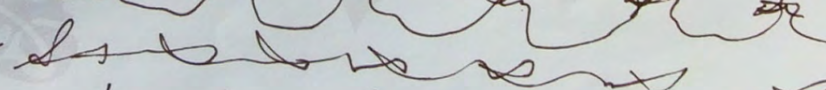
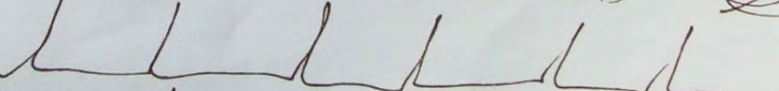
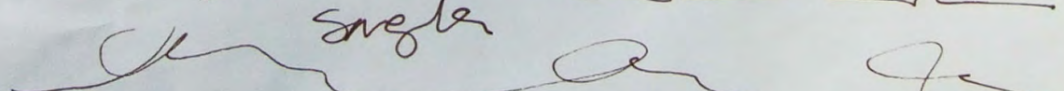
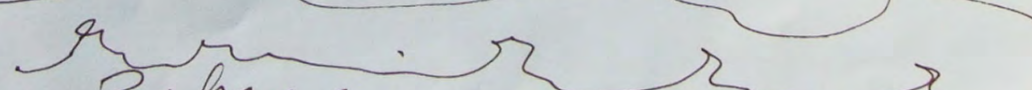


PALAZZO CONTARINI
DELLA
PORTA DI FERRO

SUITE & APARTMENTS IN VENICE



slightly fine
beats
irregular

lung 
large Intestine 
Stomach 
Spleen 
LB 
Percardium 
Heart ^{slightly} 
Small Int. 
Gall Bladder 
Uterus 
Bladder 
Kidney 


Palmist

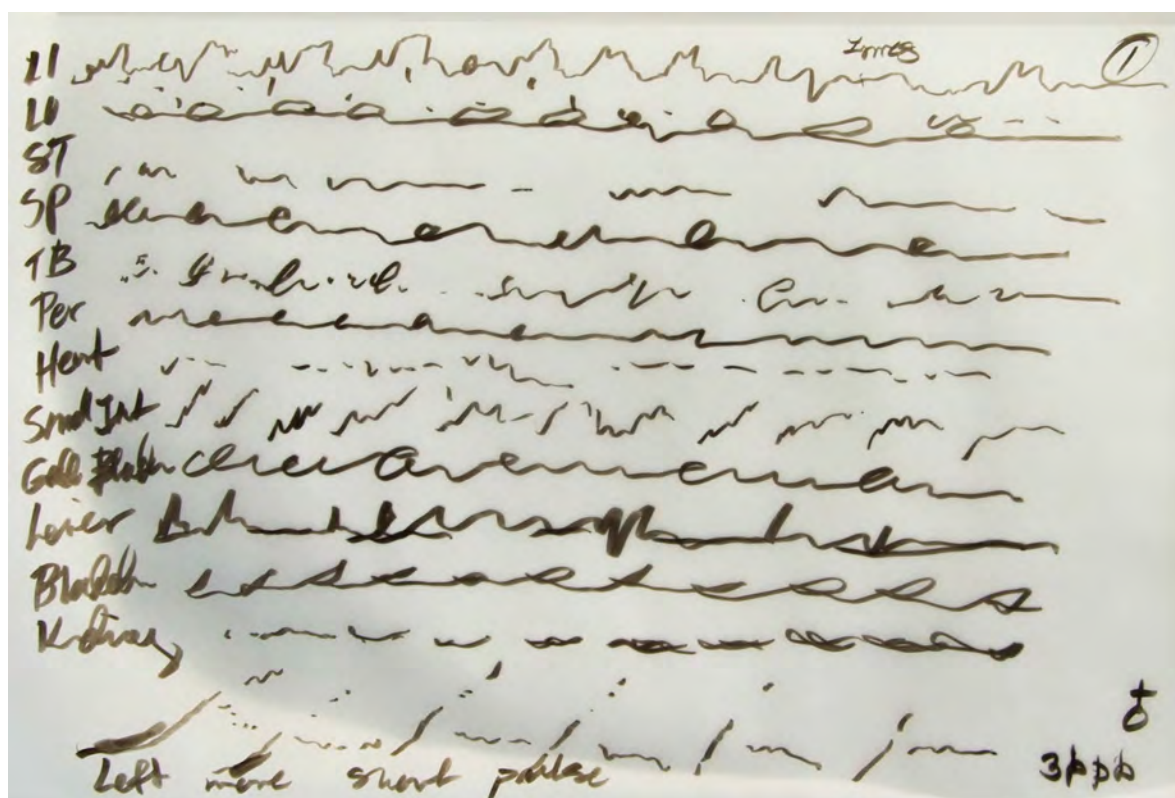
PALAZZO CONTARINI DELLA PORTA DI FERRO

Castello 2926 • 30122 Venezia, Italia

www.palazzocontarini.com • info@palazzocontarini.com

Tel. +39 041 822 6943 Fax +39 041 822 0987

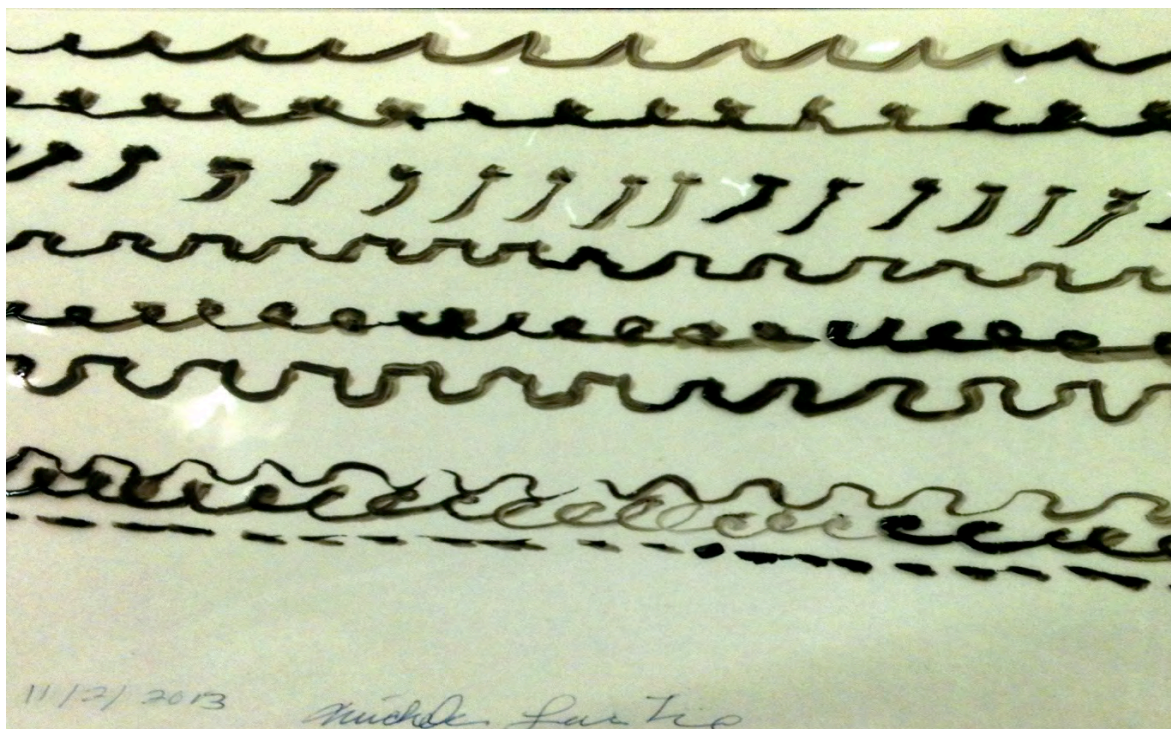
Doc. 2: Palazzo Contorini 2 (2015), Pulse Project at the Venice Biennale. [notation/ document] © Michelle Lewis-King. Palazzo Stationary, Ink. Photo: Léna Lewis-King.



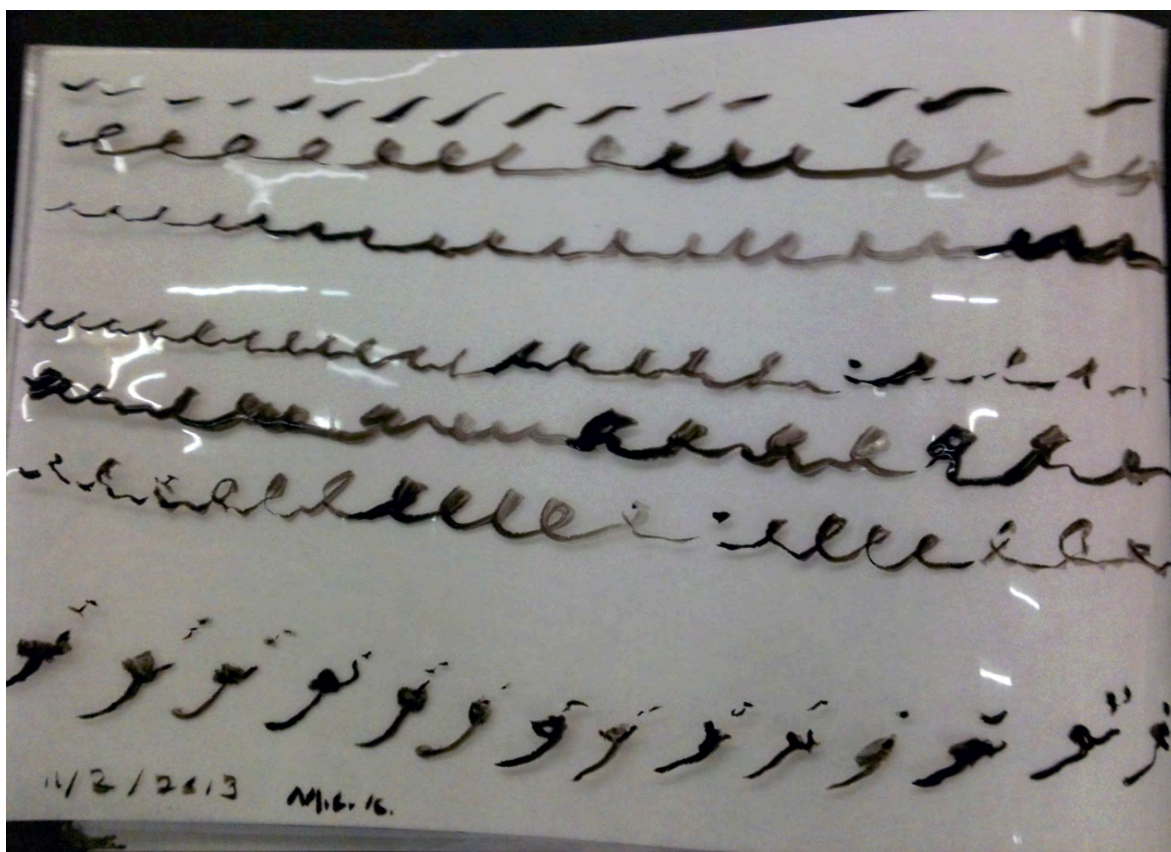
Doc. 3: *The Stags Head 1* (2015), [notation/ document] part of 'Cerebellum' in London, curated by Charlotte Hailey-Watts. © Michelle Lewis-King. Trace paper, ink. Photo: Léna Lewis-King.



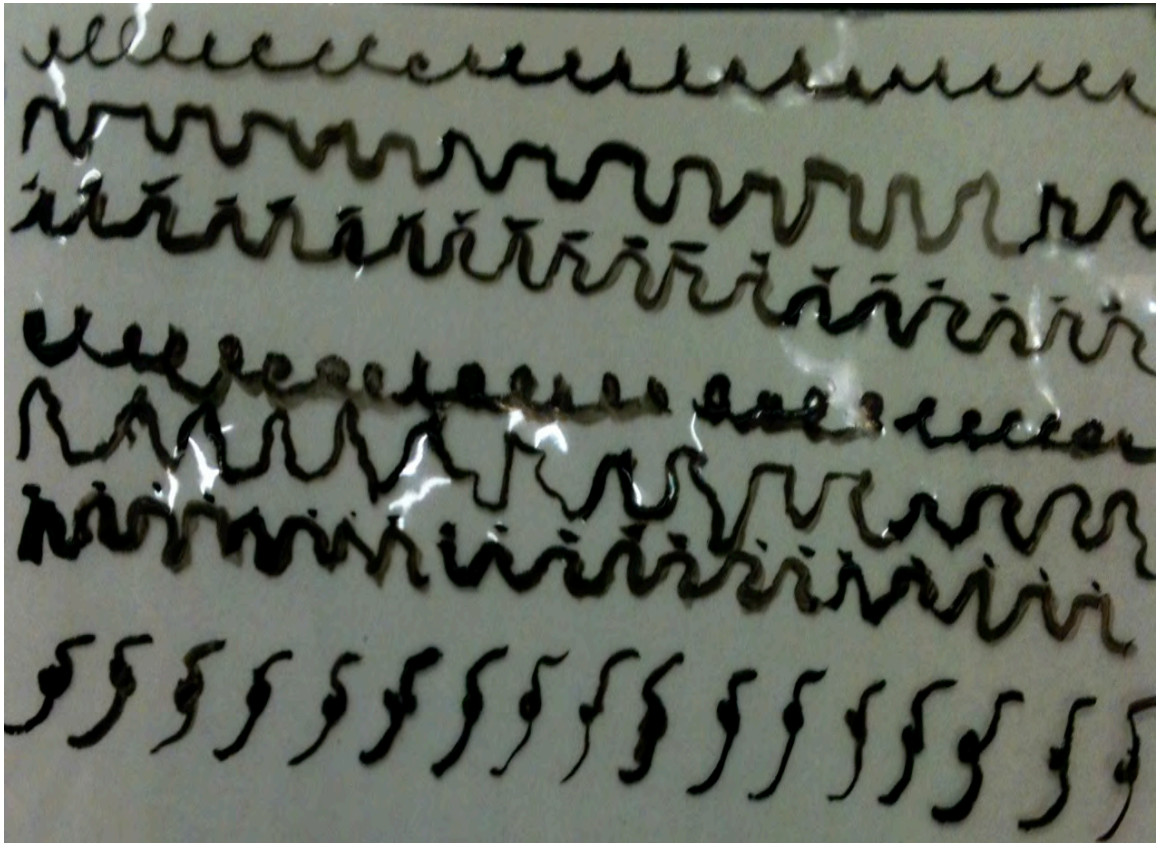
Doc.4: *St. Leonards-on-Sea 1* (2015). [notation/ document] © Michelle Lewis-King. Materials: Acetate, ink.



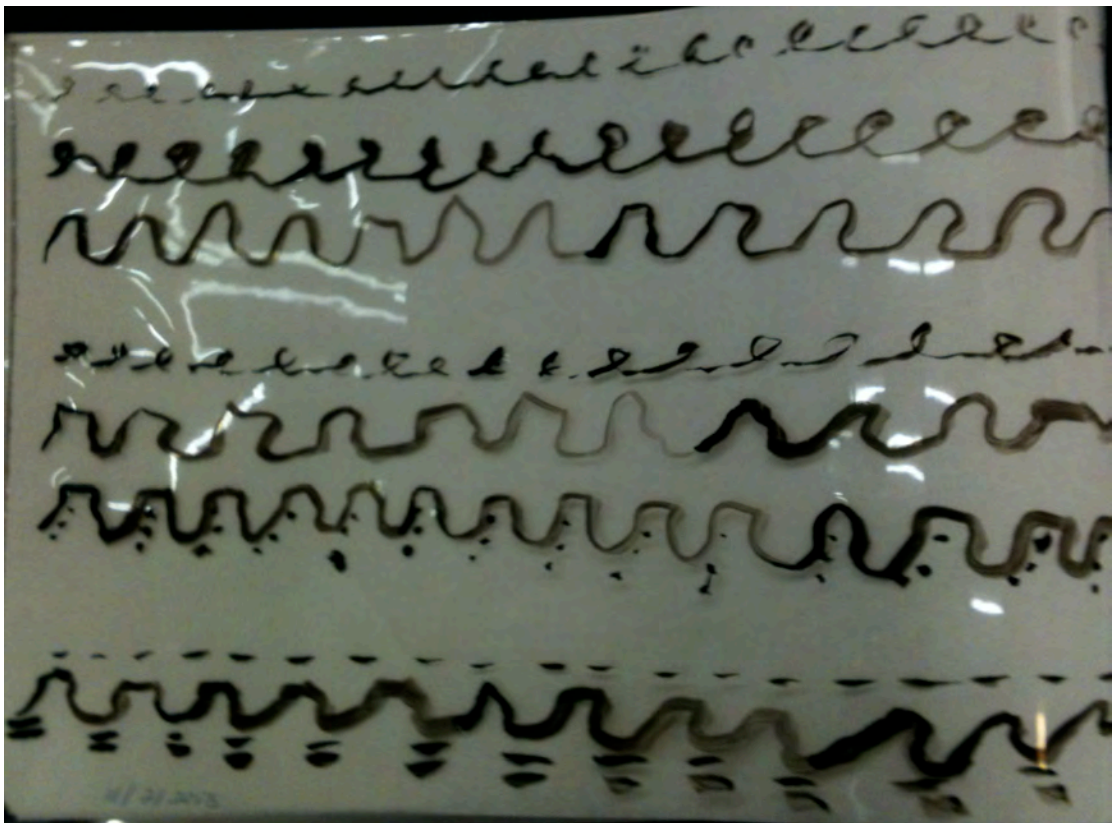
Doc. 5: V&A Notation 6 (2013). [Ink Painting on Acetate] © Michelle Lewis-King. Photo: Nick Fudge. Dimensions: 8" x 14."



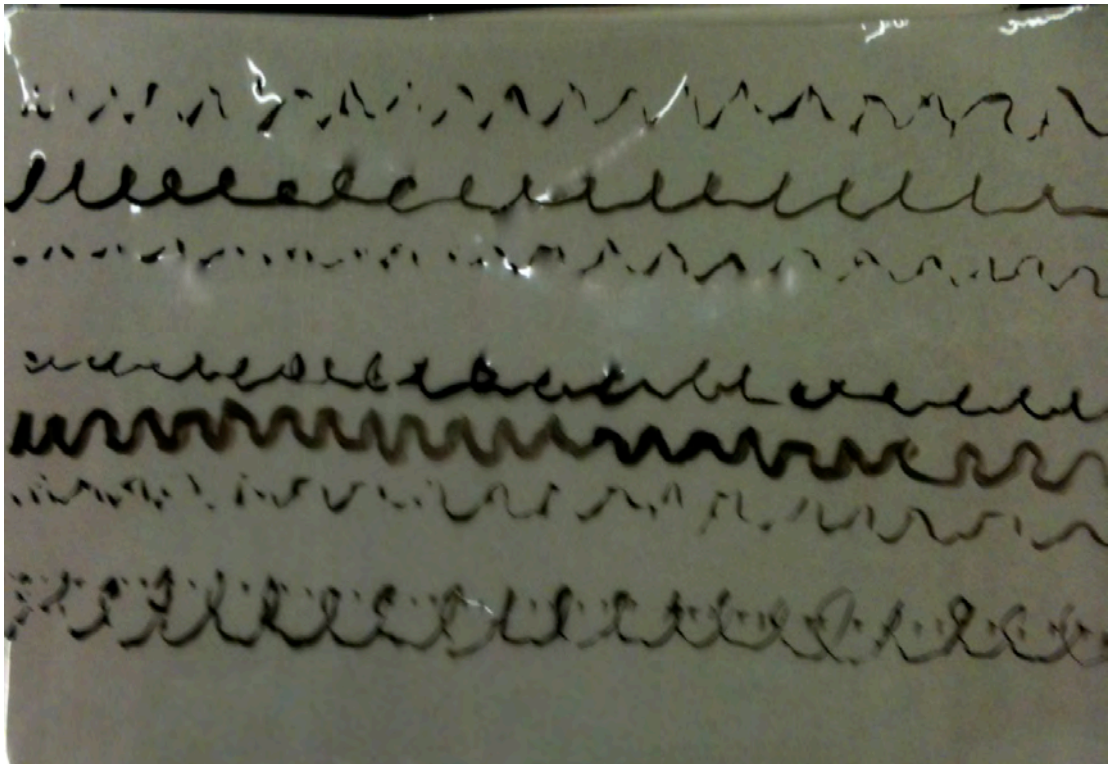
Doc. 6: V&A 1 Notation (2013) [notation/document], performance for 'Digital Futures' at the V&A Museum, curated by Irini Papadimitriou. © Michelle Lewis-King. Materials: Acetate, ink.



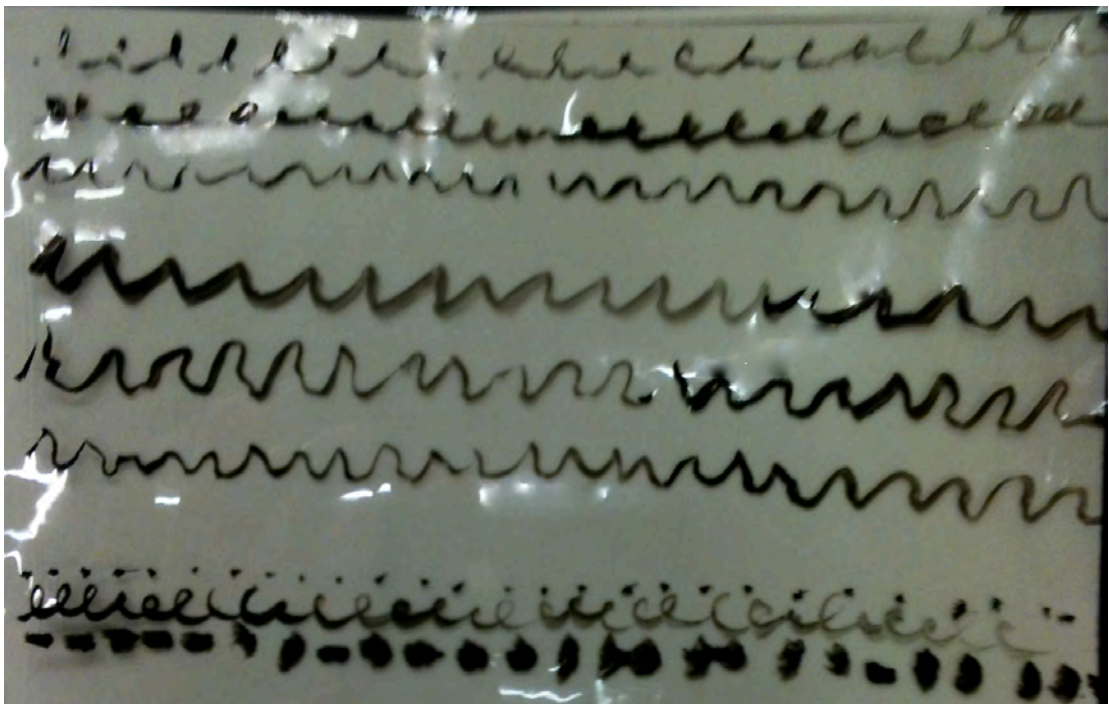
Doc. 7: *V&A 3 Notation* (2013) [notation/document], performance for 'Digital Futures' at the V&A Museum, curated by Irini Papadimitriou. © Michelle Lewis-King. Materials: Acetate, ink.



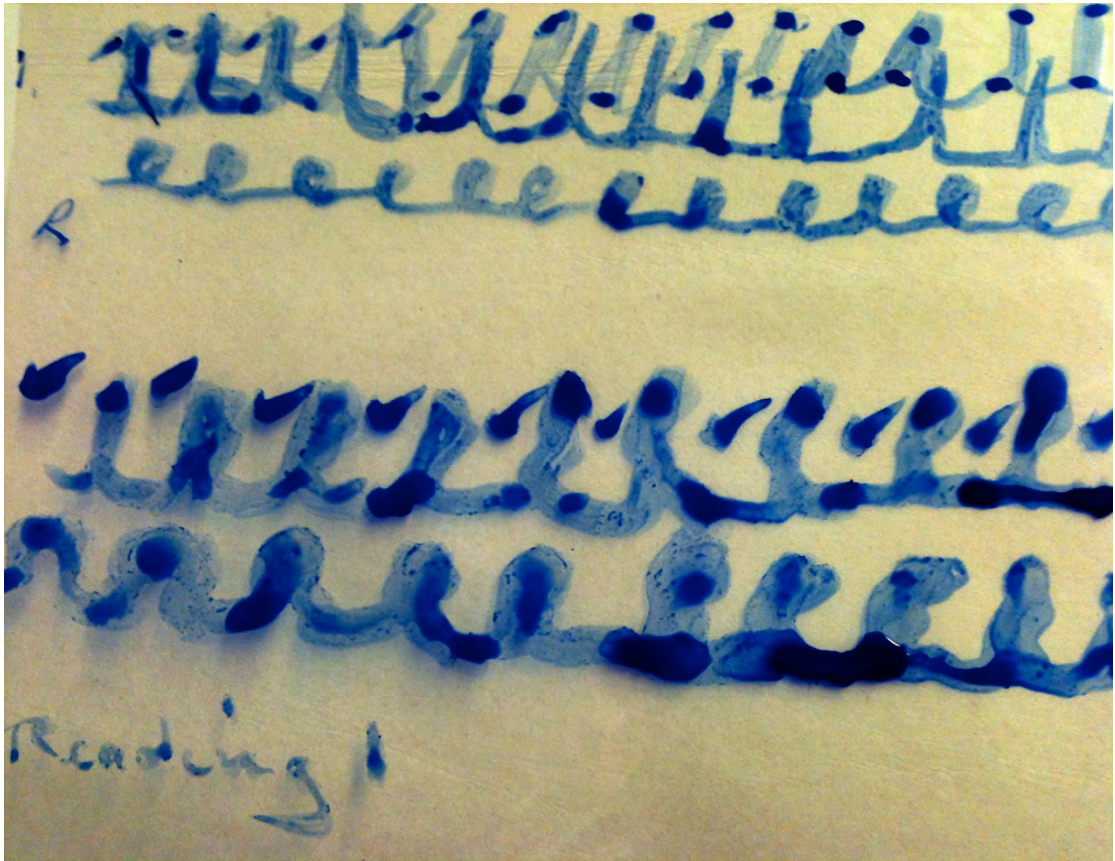
Doc. 8: *V&A 4 Notation* (2013) [notation/document], performance for 'Digital Futures' at the V&A Museum, curated by Irini Papadimitriou. © Michelle Lewis-King. Materials: Acetate, ink.



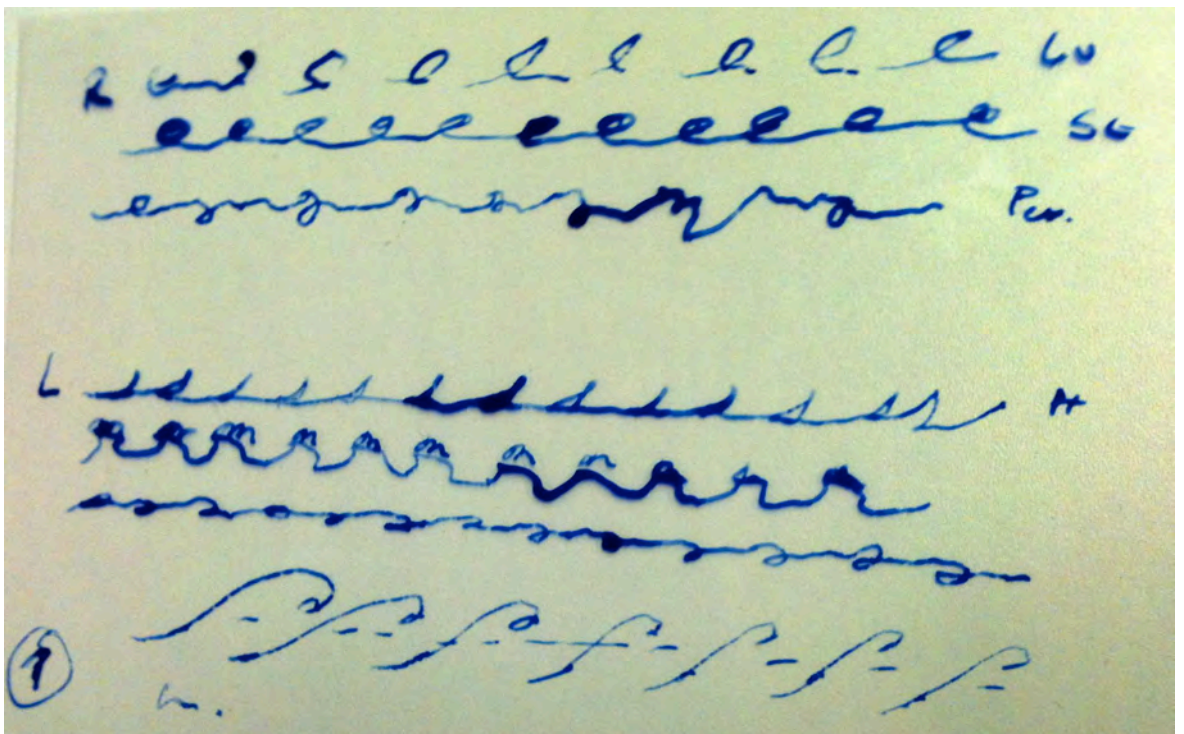
Doc. 9: *V&A 6 Notation* (2013) [notation/document], performance for 'Digital Futures' at the V&A Museum, curated by Irini Papadimitriou. © Michelle Lewis-King. Materials: Acetate, ink.



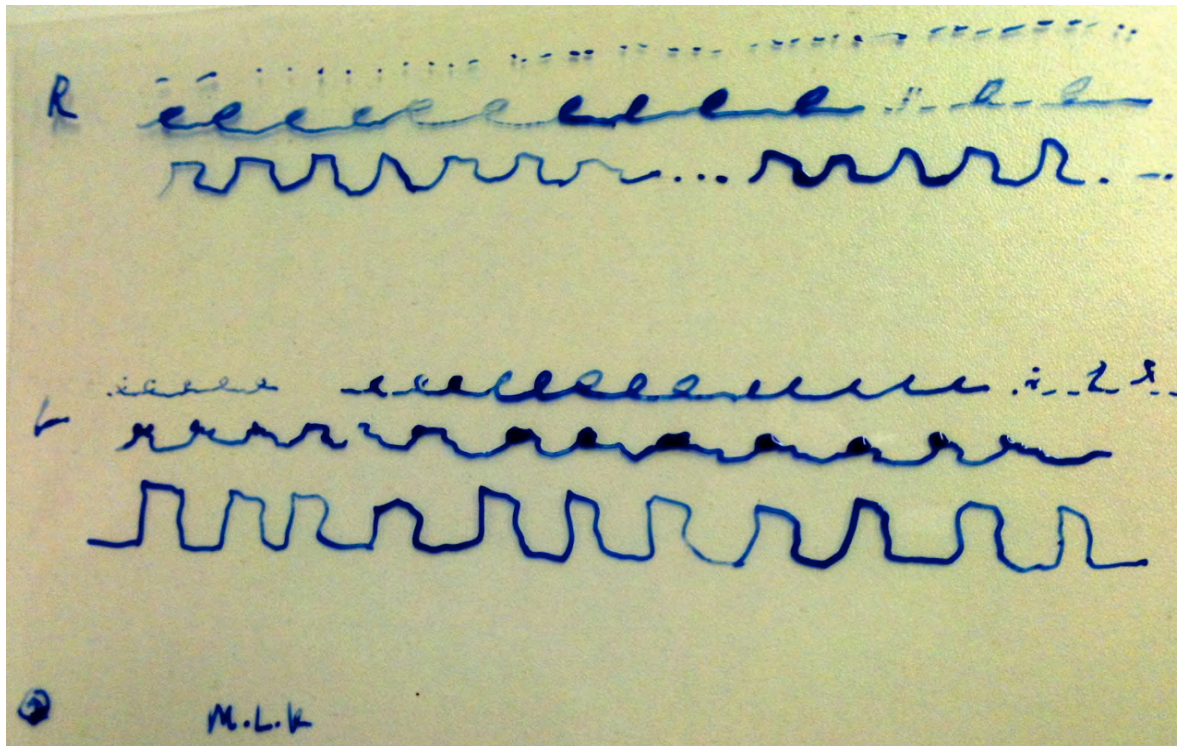
Doc. 10: *V&A 7 Notation* (2013) [notation/document], performance for 'Digital Futures' at the V&A Museum, curated by Irini Papadimitriou. © Michelle Lewis-King. Materials: Acetate, ink.



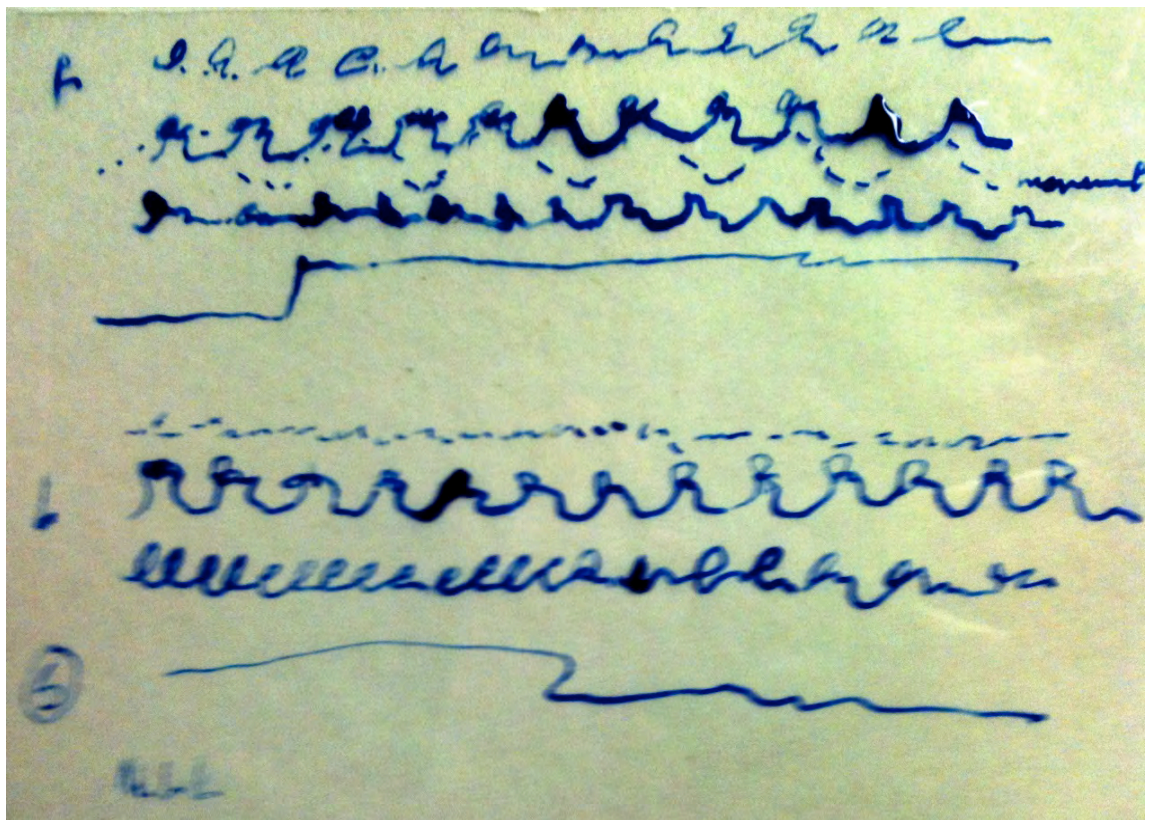
Doc. 11: *Reading 1 Notation* (2013) [notation/document], performance for 'JAM 2013,' University of Reading. © Michelle Lewis-King. Materials: Acetate, ink.



Doc. 12: *Reading Notation 9* (2014). [Ink Drawing on Acetate] © Michelle Lewis-King. Photo: Michelle Lewis-King. Dimensions: 5" x 8."



Doc. 13: *Reading 2 Notation* (2013) [notation/document], performance for 'JAM 2013,' University of Reading. © Michelle Lewis-King. Materials: Acetate, ink.



Doc. 14: *Reading 5 Notation* (2013) [notation/document], part of 'JAM 2013,' University of Reading. © Michelle Lewis-King. Materials: Acetate, ink.

② King's College Anatomy Museum

♀ 30s 4 beats per breath Yu/Zhi scale

Overall impressions: The force of the pulse is 'hidden' at the kidney level.

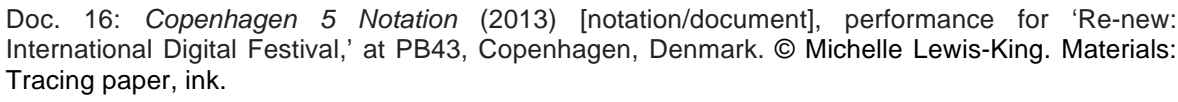
Main features: Personal signature -

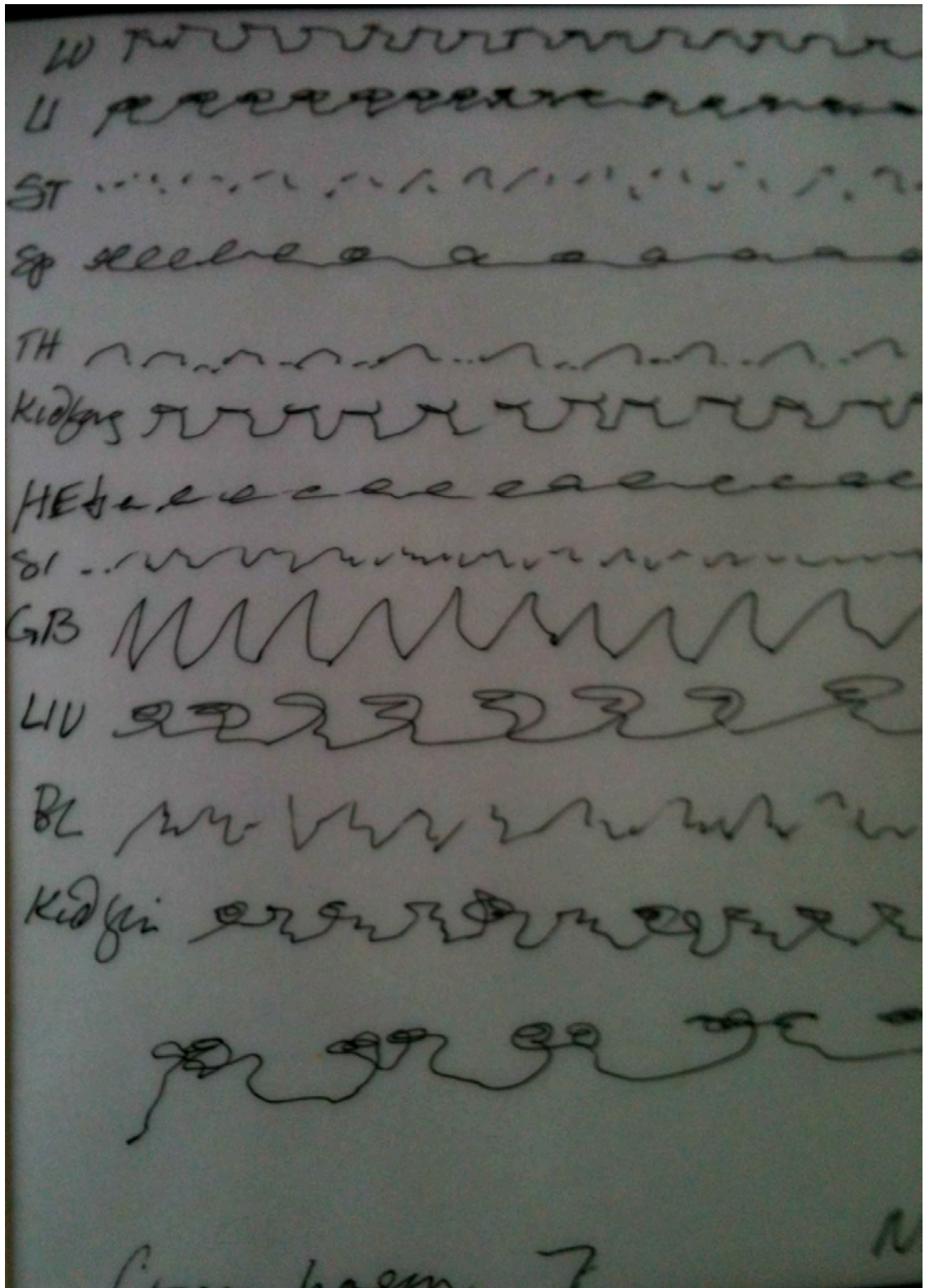
- 'Driven' and with 'force' but is gentle in expression... mysterious unfolding.
- Pulse has a cadence that feels like / \ - / \ - / \ - / \ - / \ -
- Gall Bladder on left is faster than other pulses and is 'very supple'.
- Overall pulse is 'big' for such a 'petite' person but is not 'excess'.
- Slightly choppy in the Lung
- Presents as a 'Water' / 'Fire' dynamic (this where the main communication takes place).

MLK

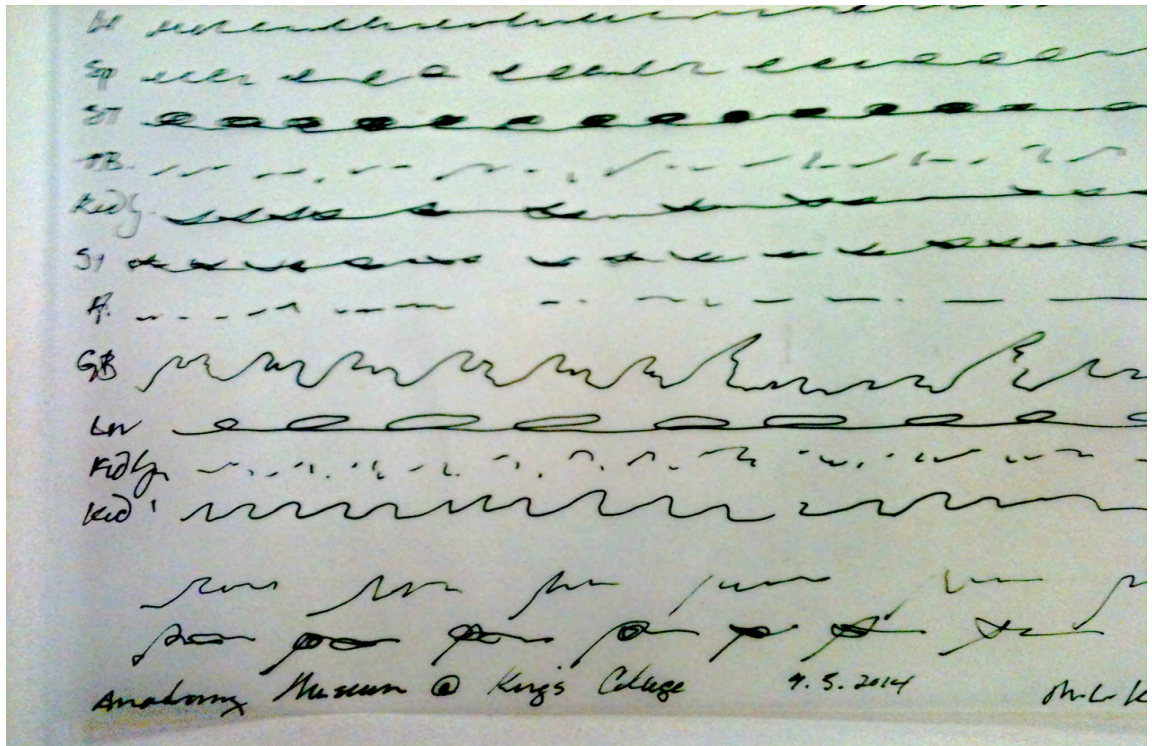
9/5/2013

Doc. 15: Kings College 2 (2013), [clinical notation] in 'Show but also Tell,' curated by Bridie Hindle, Anatomy Museum, Kings College, London. © Michelle Lewis-King. Graph paper, ink.

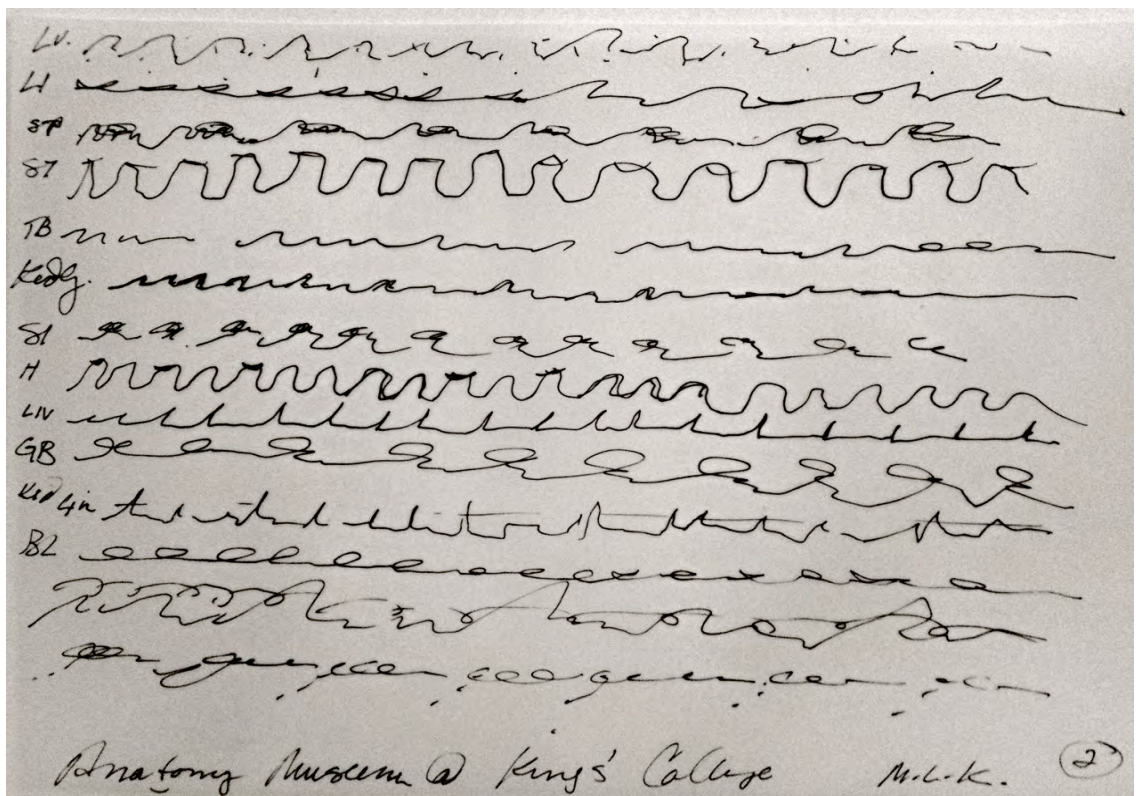




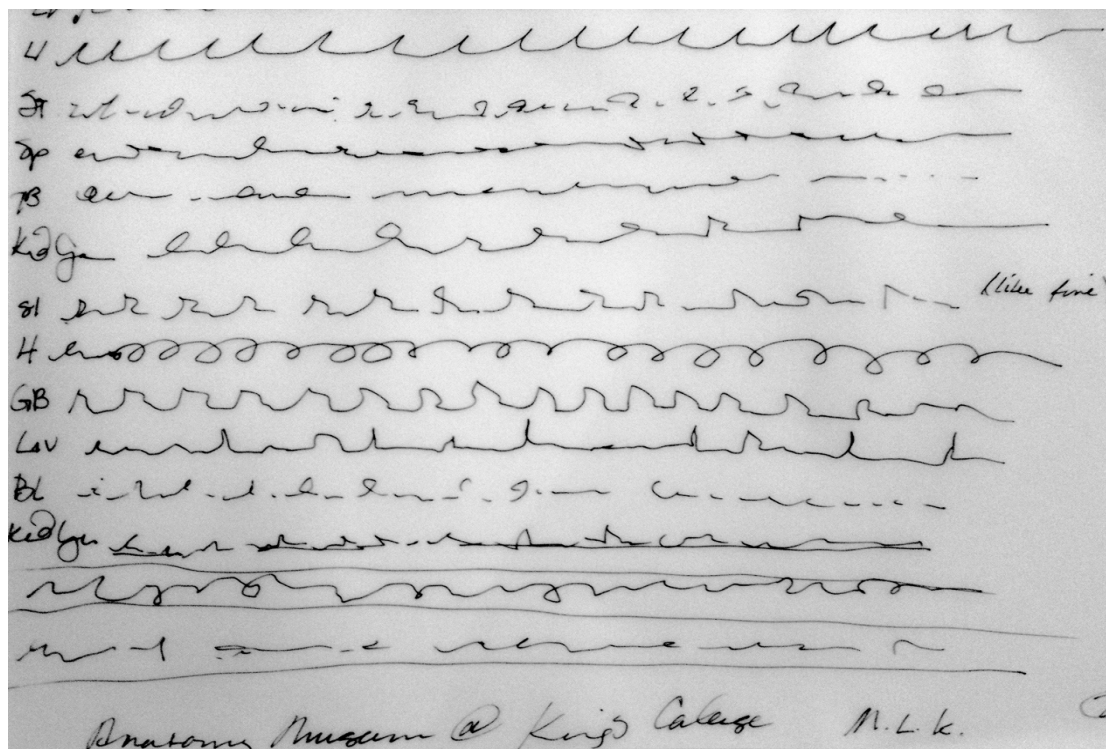
Doc. 17: *Copenhagen 7 Notation* (2013) [notation/document], performance for 'Re-new: International Digital Festival,' at PB43, Copenhagen, Denmark. © Michelle Lewis-King. Materials: Tracing paper, ink.



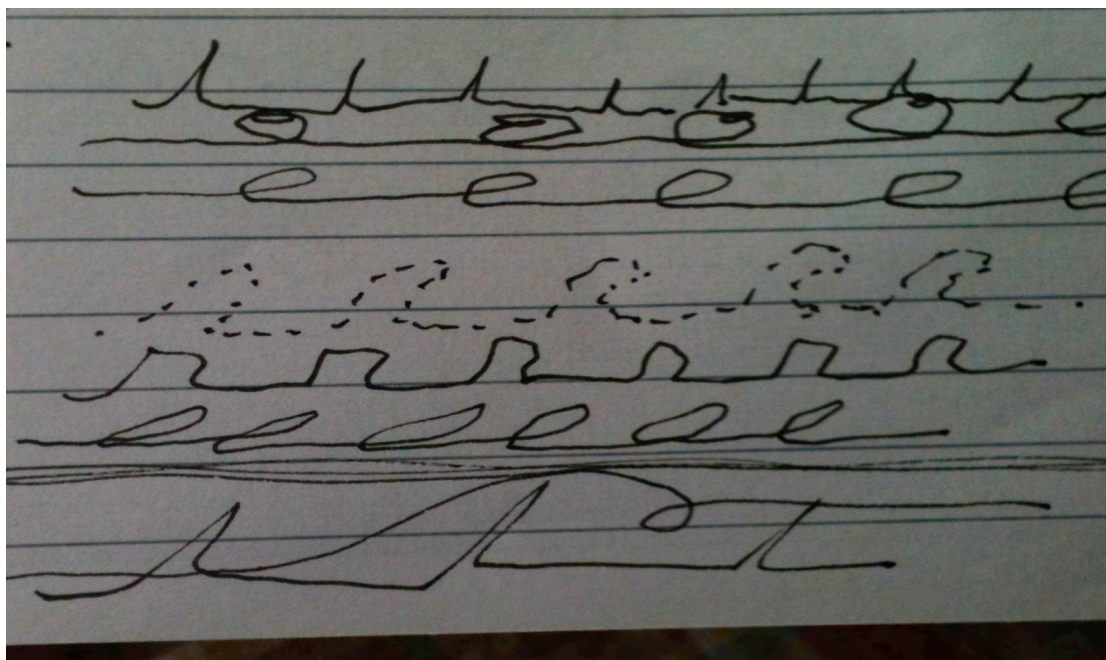
Doc. 18: *Anatomy Museum Notation 1* (2014) [notation/document], performance for 'Show But Also Tell,' curated by Bridie Hindle. Anatomy Museum, Kings College, London. © Michelle Lewis-King. Materials: Tracing paper, ink.



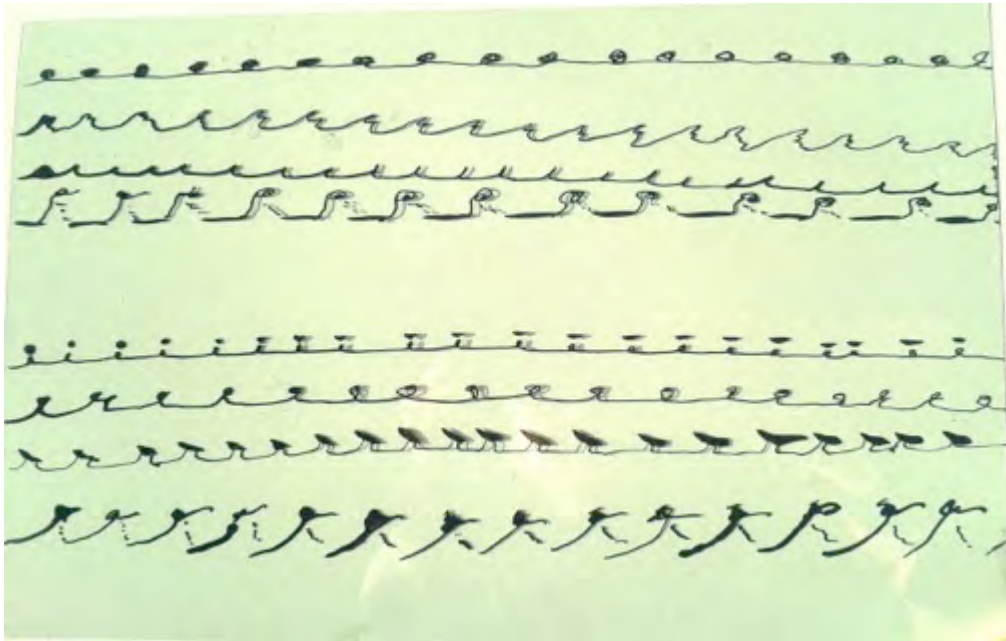
Doc. 19: *Anatomy Museum Notation 2* (2014) [notation/document], performance for 'Show But Also Tell,' curated by Bridie Hindle. Anatomy Museum, Kings College, London. © Michelle Lewis-King. Materials: Tracing paper, ink.



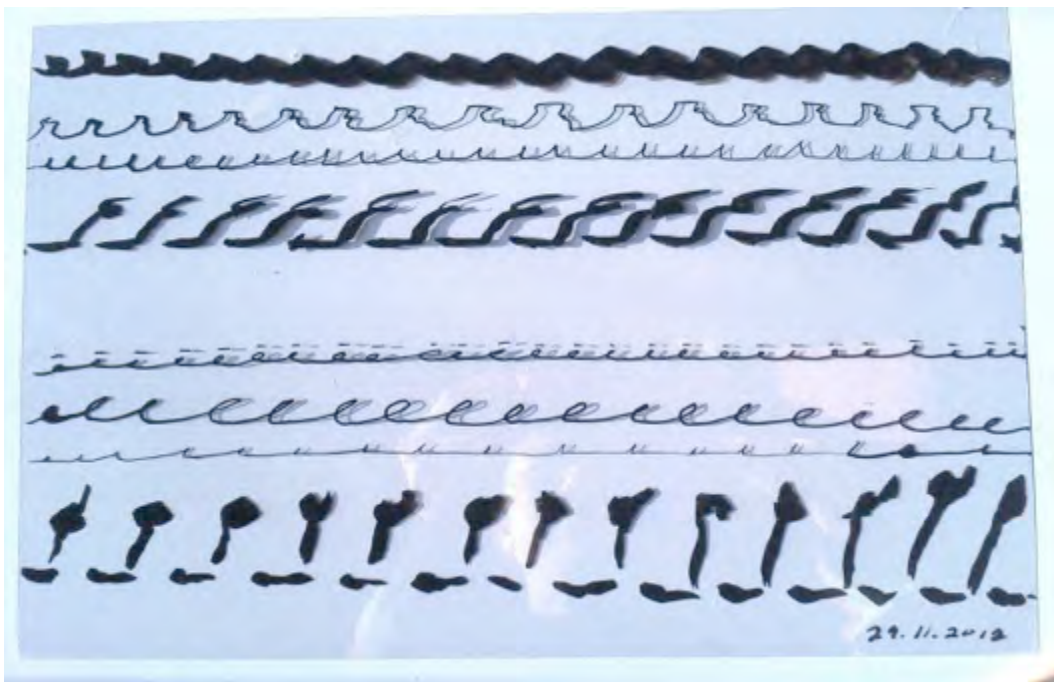
Doc. 20: *Anatomy Museum Notation 7* (2014) [notation/document], performance for 'Show But Also Tell,' curated by Bridie Hindle. Anatomy Museum, Kings College, London. © Michelle Lewis-King. Materials: Tracing paper, ink.



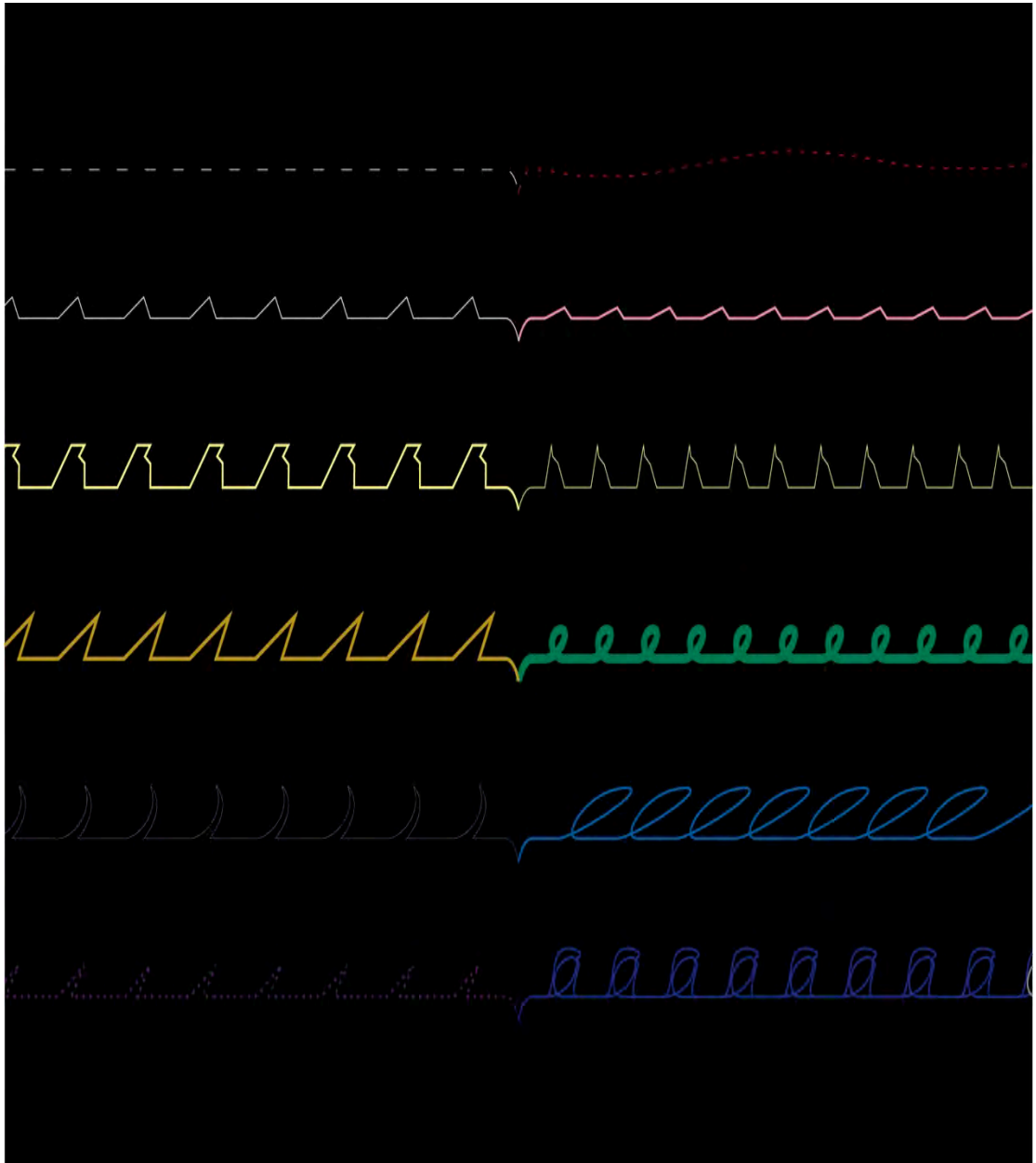
Doc. 21: *Leeds Notation 4* (2012) [notation/document], performance for 'Live Interface: Performance, Art Music,' University of Leeds. © Michelle Lewis-King. Materials: Notebook paper, ink.



Doc. 22: *Sumie Kent 1 November (2012) [notation], 1 of 2 notations for PULSE - a collaborative project with Ryoko Akama, Sumie Kent and Michelle Lewis-King. © Michelle Lewis-King. Materials: Acetate, ink.*



Doc. 23: *Sumie Kent 2 November (2012) [notation], 1 of 2 notations for PULSE - a collaborative project with Ryoko Akama, Sumie Kent and Michelle Lewis-King. © Michelle Lewis-King. Materials: Acetate, ink.*



Doc. 24: *Pulse Notation 1* (2011) [digital image], digital notation of performance for First Friday Event, Oakland, CA. © Michelle Lewis-King.

Appendix X

A Simple Brake-down of SuperCollider Code:

Given the command:

```
{SinOsc.ar(262.dup, mul: LFNoise2.kr(3, 3).max(0) * 0.009)}.play;
```

1. 'SinOsc.ar' in the first part of the code:

The 'SinOsc' is an abbreviation of a sine 'wavetable'⁴⁴⁰ oscillator and the 'ar' is an abbreviation of audio rate. This command is a sine-wave sound object that is played back at a particular 'audio rate' (or frequency).

2. '262 Hz'

This number represents the audio rate or frequency in which the sine-wave object repeats per second. This creates the 'pitch' of the wave.

3. '.dup'

This is an abbreviation for 'duplicate.' This means that the frequency/pitch is duplicated into two sine-waves of 262 Hz. This enables these two sine-waves to be played in two channels (stereo).

4. 'mul: LFNoise2'

These sine-waves (262 Hz) are then shaped/modulated via the 'mul' command – which is abbreviated for 'multiply.' In this context, 'mul' means to amplify the '262 Hz' single through a 'low frequency noise' object (LFNoise).

5. 'kr(3,3).max(0)'

This is an abbreviation for 'control rate'. This means that the sine-waves (262) have been modified through the low frequency object at the frequency control rate of 3 waves per cycle in both output channels 'kr(3, 3)'.

6. '* 0.009'.

This symbol '*' is an abbreviation for amplitude, so '* 0.009' signifies the (very low) value that the signal volume of the overall sound object will be played at.

7. 'play'

Tells the server to evaluate (play) the audio file.

⁴⁴⁰ Defined in Philip Kortum's *HCI Beyond the GUI: Design for Haptic, Speech, Olfactory, and Other Nontraditional Interfaces* as: 'a recorded version of real-world sound' (Kortum, 2008, p.159)

Appendix XI

Details of SuperCollider Compositions:

The following five compositions are selected from over forty-five compositions. Each bespoke composition demonstrates the composing process of using one of the five ‘frequencies’ as a fundamental tone.⁴⁴¹ Furthermore, each composition is arranged in this appendix to demonstrate the movement/direction of the five frequencies according to the ‘generative’ (enhancing) sequence of the *wǔxíng* cycle - beginning with the Earth frequency (264Hz) and progressing to the Fire frequency (399Hz), e.g., *gong> shāng> yǔ> jué> zhī*.⁴⁴²

These compositions are programmed for a ‘multichannel’ sound installation to represent a way of sonifying the ‘meridian/channels’ of the body by using each speaker output as a ‘meridian/channel.’

1. Central Saint Martins 1 (May 2014)

// 20's Female 5bpb, (Gong Scale). Principle: Tonify (amplify) Spleen, Stomach and Kidney, Cool Fire and regulate the Heart.

```
(
Routine
({
2.wait;
// Sound objects 'a'– 'b' represent the faint and electric-like vibrations in
Lung, Large Intestine, Spleen, Stomach and Gall Bladder pulse waveforms felt
initially when pressing down
a = {Resonz.ar(
Dust2.ar(9), 264, 0.0009, 3050) +
//Spleen
Resonz.ar(
Dust2.ar(9), 528, 0.0009, 3050) +
//Stomach
Resonz.ar(
Dust2.ar(9), 296, 0.0009, 3000) * 3.reciprocal;
//Lung
}.play(fadeTime:16, outbus: 0);
b = {Resonz.ar(
Dust2.ar(9), 594, 0.0009, 3000) +
// Large Intestine
Resonz.ar(
Dust2.ar(9), 668, 0.0009, 3050) +
// Gall Bladder
Resonz.ar(
Dust2.ar(9), 792, 0.0009, 3080) * 3.reciprocal;
//Bladder
}.play(fadeTime:15, outbus: 1);

8.wait;
// Sound objects 'c'– 'k' represent the flow and frequencies of qi along the
channels (luo mai) as felt in the pulse. These sound objects harmonise the
volume, rhythm and shape of the waveform frequencies of each of the organ (Zang-
fu) systems
c = {SinOsc.ar(
```

⁴⁴¹ For discussion on this, see the section entitled: ‘Soundscape Composition as Healing Modality’ in Chapter Four.

⁴⁴² Refer to the diagram ‘Figure 5: *Five Elements: Cycles of Generation and Control* (2007)’ in Chapter Three for a demonstration of the ‘generative’ pattern of the *wǔxíng* cycle.


```

freq: [263, 264],
//Spleen - increased volume to boost qi
mul:
SinOsc.kr([1.9, 0.45], mul: 0.08).abs
)}.play(outbus: 2, fadeTime:25);
d = {SinOsc.ar(
freq: [294, 294],
//Lung - increased volume to boost qi
mul:
SinOsc.kr([1.9, 0.45], mul: 0.08).abs
)}.play(outbus: 0, fadeTime:27);
e = {SinOsc.ar(
freq: [330, 330],
// Liver - reduced volume to regulate the flow of Liver blood
mul:
SinOsc.kr([1.9, 0.45], mul: 0.06).abs
)}.play(outbus: 7, fadeTime:27);
~fe = {SinOsc.ar(
freq: [392, 392],
// Heart - increased volume and steady rhythm to regulate Heart qi and blood
mul:
SinOsc.kr([1.9, 0.45], mul: 0.06).abs
)}.play(outbus: 4, fadeTime:27);
g = {SinOsc.ar(
freq: [440, 440],
// Kidney Yin - increased volume and reduced rhythm to regulate original source
qi (Yuan Qi)/also to use 'Water' to subdue 'Fire'.
mul:
SinOsc.kr([1, 0.2], mul: 0.08).abs
)}.play(outbus:5, fadeTime:23);
h = {SinOsc.ar(
freq: [528, 528],
// Stomach - increased volume to boost Stomach qi
mul:
SinOsc.kr([1.9, 0.45], mul: 0.08).abs
)}.play(outbus: 3, fadeTime:25);
i = {SinOsc.ar(
freq: [594, 594],
// Large Intestine - increased volume to boost Large Intestine qi
mul:
SinOsc.kr([1.9, 0.45], mul: 0.08).abs
)}.play(outbus: 1, fadeTime:27);
j = {SinOsc.ar(
freq: [668, 668],
//Gall Bladder - increased volume and reduced rhythm to consolidate Gall Bladder
qi and regulate the flow of Liver Qi
mul:
SinOsc.kr([1.9, 0.45], mul: 0.06).abs
)}.play(outbus: 6, fadeTime:27);
k = {SinOsc.ar(
freq: [792, 792],
// Small Intestine - increased volume and rhythm to regulate (and tonify) the
Small Intestine qi
mul:
SinOsc.kr([1.9, 0.45], mul: 0.06).abs
)}.play(outbus: 4, fadeTime:27);

14.wait;
//Lower Gong: Earth Element - the sound objects 'l' - 'p' represent the frequency
and waveforms of the 5 Zang (Organs)
l = {SinOsc.ar([264.69, 264.69], mul:
LFNoise1.kr([2, 2]).max(0) * 0.33)}.play(outbus: 2, fadeTime:22);
//Earth-Spleen frequency
m = {SinOsc.ar([296.27, 296.27], mul:
LFNoise1.kr([2, 2]).max(0) * 0.31)}.play(outbus: 0, fadeTime:22);
//Metal -Lung frequency

```

```

n = {SinOsc.ar([330.95, 330.95], mul:
LFNoise1.kr([1, 1]).max(0) * 0.2)}.play(outbus: 7, fadeTime:22);
//Wood - Liver frequency
o = {SinOsc.ar([395.17, 395.17], mul:
LFNoise1.kr([1, 1]).max(0) * 0.21)}.play(outbus: 4, fadeTime:22);
// Fire - Heart frequency
p = {SinOsc.ar([440.69, 444.69], mul:
LFNoise1.kr([1, 1]).max(0) * 0.27)}.play(outbus: 5, fadeTime:22);
// Water - Kidney Yin frequency
//Moderate Gong pulse - the sound objects 'q' - 'w' represent the overall pulse
speed is slowed down from 5bpb to a more ideal 4bpb
q = {SinOsc.ar(264.69.dup, mul:
SinOsc.kr((0.67).abs, mul: 0.09) *
EnvGen.kr(
Env.linen.circle, 1, 1, 0, 0.5))}.play(outbus: 3, fadeTime:22);
r = {SinOsc.ar(296.27.dup, mul:
SinOsc.kr((0.6).abs, mul: 0.09) *
EnvGen.kr(
Env.linen.circle, 1, 1, 0, 0.5))}.play(outbus: 1, fadeTime:22);
t = {SinOsc.ar(330.95.dup, mul:
SinOsc.kr((0.6).abs, mul: 0.09) *
EnvGen.kr(
Env.linen.circle, 1, 1, 0, 0.5))}.play(outbus: 7, fadeTime:22);
u = {SinOsc.ar(395.17.dup, mul:
SinOsc.kr((0.6).abs, mul: 0.09) *
EnvGen.kr(
Env.linen.circle, 1, 1, 0, 0.5))}.play(outbus: 4, fadeTime:22);
v = {SinOsc.ar(440.6.dup, mul:
SinOsc.kr((0.6).abs, mul: 0.09) *
EnvGen.kr(
Env.linen.circle, 1, 1, 0, 0.5))}.play(outbus: 5, fadeTime:22);
w = {SinOsc.ar(55.dup, mul:
SinOsc.kr((0.6).abs, mul: 0.006) *
EnvGen.kr(
Env.linen.circle, 1, 1, 0, 0.5))}.play(outbus: 6, fadeTime:22);

//Upper Gong Earth Element - the sound objects 'x' - '~b' represent the frequency
and waveforms of the 5 Fu (Organs)
x= {SinOsc.ar([528, 528], mul:
LFNoise1.kr([2, 2]).max(0) * 0.23)}.play(outbus: 3, fadeTime:29);
//Earth -Stomach frequency
y = {SinOsc.ar([594, 594], mul:
LFNoise1.kr([2, 2]).max(0) * 0.2)}.play(outbus: 1, fadeTime:22);
//Metal - Large Intestine frequency
z = {SinOsc.ar([668, 668], mul:
LFNoise1.kr([1, 1]).max(0) * 0.1)}.play(outbus: 6, fadeTime:22);
//Wood - Gall Bladder frequency
~a = {SinOsc.ar([792, 792], mul:
LFNoise1.kr([1, 1]).max(0) * 0.1)}.play(outbus: 4, fadeTime:22);
//Fire - Small Intestine frequency
~b = {SinOsc.ar([891, 891], mul:
LFNoise1.kr([1, 1]).max(0) * 0.15)}.play(outbus: 5, fadeTime:22);
// Water - Bladder frequency
// Sound objects '~c' - '~e' represent the cadences of the Heart, Bladder, Kidney
Yin and Yang pulse waveforms - to use 'Water' to cool 'Fire'.
~c = {SinOsc.ar(392.68.dup, mul:
SinOsc.kr((0.6).abs, mul: 0.1) *
EnvGen.kr(
Env.triangle.circle, 1, 1, 0, 0.5))}.play(outbus: 4, fadeTime: 15);
~d = {SinOsc.ar(440.00.dup, mul:
SinOsc.kr((0.6).abs, mul: 0.05) *
EnvGen.kr(
Env.triangle.circle, 1, 1, 0, 0.5))}.play(outbus: 5, fadeTime: 15);
~e = {
SinOsc.ar(63.dup, mul:
SinOsc.kr((0.6).abs, mul: 0.0038) *

```

```

EnvGen.kr(
Env.triangle.circle, 1, 1, 0, 0.5)).play(outbus: 6, fadeTime: 15);
// Sound objects '~f' - '~n' represents the overall cadence of the blood flow
through the organs(Zang-fu), networks (luo) and vessels (mai)
~f = {SinOsc.ar([264, 264], 5,
LFPulse.kr(4) * 0.4)
// Spleen
*
EnvGen.kr(
Env.perc.circle, 1, 1, 0, 0.99);
}.play(outbus: 2, fadeTime:35);
~g = {SinOsc.ar([264, 264], mul:
LFNoise0.kr([4, 4]).max(0) * 0.085)}.play(outbus: 2, fadeTime:20);
~h = {SinOsc.ar([130, 132], 5,
LFPulse.kr(4) * 0.35)
*
EnvGen.kr(
Env.perc.circle, 1, 1, 0, 0.99);
//Spleen
}.play(outbus: 2, fadeTime:35);
~i = {SinOsc.ar([130, 132], mul:
LFNoise0.kr([4, 4]).max(0) * 0.05)}.play(outbus: 2, fadeTime:20);
~j = {SinOsc.ar([525, 526], 5,
LFPulse.kr(4) * 0.3)
//Stomach
*
EnvGen.kr(
Env.perc.circle, 1, 1, 0, 0.99);
}.play(outbus: 3, fadeTime:35);
~k = {SinOsc.ar([395, 395], mul:
LFNoise0.kr([4, 4]).max(0) * 0.07)}.play(outbus: 4, fadeTime:20);
//Heart
~l = {SinOsc.ar([65, 65], 5,
LFPulse.kr(4) * 0.009)
*
EnvGen
.kr(
Env.perc.circle, 1, 1, 0, 0.99);
}.play(outbus: 6, fadeTime:35);
~m = {SinOsc.ar([65, 65], mul:
LFNoise0.kr([4, 4]).max(0) * 0.01)}.play(outbus: 0, fadeTime:22);
~n = {SinOsc.ar([36.7, 37].midicps, mul: 0.0099)}.play(outbus: 3, fadeTime:22);

25.wait;
//Sound objects '~o' - '~q' represent the vibrations/pulse waveforms along the
Triple Burner and Kidney Yang Zang-Fu pair - supports Kidney network.
~o = {SinOsc.ar(55.dup, mul:
SinOsc.kr((0.5).abs, mul: 0.01) *
EnvGen.kr(
Env.triangle.circle, 1, 1, 0, 1))).play(outbus: 6, fadeTime: 16);
~p = {var
vibrato;
vibrato =
SinOsc.ar(freq: 0.5, mul: 0.01, add: 55);
SinOsc.ar(vibrato, mul: 0.018)
}.play(outbus: 6, fadeTime: 15);
~q = {var
vibrato;
vibrato =
SinOsc.ar(freq: 0.5, mul: 0.01, add: 55);
SinOsc.ar(vibrato, mul: 0.018)
}.play(outbus: 2, fadeTime: 14);

1.wait;
a.release(26);
b.release(26);

```

```

l.release(26);
m.release(26);
n.release(26);
o.release(26);
p.release(26);
q.release(26);
r.release(26);
t.release(26);
u.release(26);
v.release(26);
w.release(26);
x.release(26);
y.release(26);
z.release(26);
~a.release(26);
~b.release(26);
~c.release(26);
~d.release(26);
~e.release(26);
~f.release(26);
~g.release(26);
~h.release(26);
~i.release(26);
~j.release(26);
~k.release(26);
~l.release(26);
~m.release(26);
~n.release(26);
2.wait;
//Sound object '~r' represents the presence of an irregular pulse waveform in
Heart/Small Intestine Zang-fu pair - this is acknowledged and moderated by water
~r
= {var x; x =
Klank.ar('[[220, 392, 440, 792],
nil, [1, 1, 1, 1]],
Dust.ar(2, 0.1));
GVerb.ar(x, 55, 55, 0.5, 0.5, 55, 0.5, 0.5, 0.35) + x;
}.play(outbus: 4, fadeTime: 5);
20.wait;
// Sound object '~t' represents the harmonising of all the Organ-network (Zang-
fu)pitches
~t = {f = 65;
[
SinOsc.ar(f*1, mul: 0.01),
SinOsc.ar(f*2, mul: 0.02),
SinOsc.ar(f*3, mul: 0.01),
SinOsc.ar(f*4, mul: 0.09),
SinOsc.ar(f*5, mul: 0.02),
SinOsc.ar(f*6, mul: 0.01),
SinOsc.ar(f*7, mul: 0.02),
SinOsc.ar(f*8, mul: 0.01),
SinOsc.ar(f*9, mul: 0.009),
SinOsc.ar(f*10, mul: 0.009),
SinOsc.ar(f*11, mul: 0.009),
SinOsc.ar(f*12, mul: 0.009)
]
}.play(fadeTime:5);
10.wait;
c.release(4);
d.release(4);
e.release(4);
~fe.release(4);
g.release(4);
h.release(4);
i.release(4);
j.release(4);

```



```

k.release(4);
~o.release(4);
~p.release(4);
~q.release(4);
~r.release(6);
~t.release(6);
}).play; )

```

2. Leeds 4 (December 2012)

// Female (Shang Pulse), 4bpb, Tonify (amplify) Lung and Kidney Meridians to boost Zong Qi.

```

(
Routine
({
1.wait;
a= {SinOsc.ar(
SinOsc.kr(1.5).linexp(-1, 1, 10, 50).dup, mul: 0.09)}.play(fadeTime: 6);
b= {SinOsc.ar([58.50, 62.07].midicps, mul:
SinOsc.kr(-1.5, 1.5).max(0) * 0.05)}.play(fadeTime:6);
c= {SinOsc.ar([67.08, 71.35].midicps, mul:
SinOsc.kr(-1.5, 1.5).max(0) * 0.05)}.play(fadeTime:7);
d= {SinOsc.ar([74.13, 58.50].midicps, mul:
SinOsc.kr(-1.5, 1.5).max(0) * 0.05)}.play(fadeTime:7);
e= {Resonz.ar(Dust2.ar(6), 140, 0.003, 900) +
Resonz.ar(Dust2.ar(6), 294, 0.003, 900) +
Resonz.ar(Dust2.ar(6), 192, 0.003, 900) * 3.reciprocal;
}.play(outbus:1, fadeTime:20);
f= {Resonz.ar(Dust2.ar(6), 240, 0.003, 900) +
Resonz.ar(Dust2.ar(6), 394, 0.003, 900) +
Resonz.ar(Dust2.ar(6), 292, 0.003, 900) * 3.reciprocal;
}.play(outbus:0, fadeTime:20);
g= {
var
sig, chain;
sig = sum({
SinOsc.ar([140, 394]), 0,2*
Decay.ar(
Dust2.ar(1),0.2, mul:0.09)).tanh } ! 7);
chain = sig;
8.do {|i| chain =
LeakDC.ar(AllpassL.ar(LPF.ar(chain*0.9,500), 0.2, {0.1}!2, 4));
};
Limiter.ar(sig+chain);
}.play(fadeTime: 25);
h= {XFade2.ar(
SinOsc.ar(192),
LFPulse.ar(0.6, 0.2, 0.03, 0.06),
LFTri.kr(0.1, -0.1), 0.03)}.play(outbus:1, fadeTime:16);
i={XFade2.ar(
SinOsc.ar(394),
LFPulse.ar(0.6, 0.3, 0.03, 0.06),
LFTri.kr(0.1, -0.1), 0.03)}.play(outbus:0, fadeTime:16);
j= {SinOsc.ar(192.dup, mul:
SinOsc.kr((0.7).abs, mul: 0.02) *
EnvGen.kr(Env.perc.circle, 1, 1, 0, 0.65))}.play(fadeTime: 24);
k= {SinOsc.ar(394.dup, mul:
SinOsc.kr((0.7).abs, mul: 0.02) *
EnvGen.kr(
Env.perc.circle, 1, 1, 0, 0.65))}.play(fadeTime: 25);
l= {SinOsc.ar(240.dup, mul:
SinOsc.kr((0.7).abs, mul: 0.02) *
EnvGen.kr(Env.perc.circle, 1, 1, 0, 0.65))}.play(fadeTime: 26);

```

```

m= {SinOsc.ar(292.dup, mul:
SinOsc.kr((0.7).abs, mul: 0.02) *
EnvGen.kr(Env.perc.circle, 1, 1, 0, 0.65))}.play(fadeTime: 27);
n= {SinOsc.ar(
freq:[192, 394],
mul: SinOsc.kr([0.5, 0.59], mul: 0.03).abs)}.play(fadeTime: 28);
o= {SinOsc.ar(
freq:[240, 292],
mul: SinOsc.kr([0.5, 0.5], mul: 0.03).abs)}.play(fadeTime: 28);
p= {LFPulse.ar(396,0,
LFTri.kr(0.25,0,0.5,0.5),0.001) }.play(outbus:0, fadeTime:19);
3.wait;
q= {LFPulse.ar(240,0,
LFTri.kr(0.2,0,0.5,0.5),0.001) }.play(outbus:1, fadeTime:19);
29.wait;
a.release(9);
b.release(9);
c.release(9);
d.release(9);
e.release(9);
f.release(9);
g.release(9);
h.release(9.3);
i.release(9.5);
j.release(10);
k.release(10);
l.release(10);
m.release(10);
n.release(10.2);
o.release(10.3);
p.release(9);
q.release(9);
}).play; )

```

3. Copenhagen 1 (December 2013)

// Female (Yu pulse), 30's 4bpb choppy, constrained, 'bringing fire forward. Tonify (amplify) the Kidney and Bladder meridians. Spread Liver Qi, Support the Shen (via boosting Water).

```

(
Routine
({
2.wait;
a = {SinOsc.ar(
SinOsc.kr(1, 1).linexp(-1, 1, 55, 110).dup, mul: 0.0004)}.play(outbus: 0,
fadeTime: 25);
b = {Pan2.ar(
PinkNoise.ar(0.09),
SinOsc.kr(0.25))}.play(fadeTime: 8);
c = {SinOsc.ar([33, 33.5].midicps, mul: 0.0055)}.play(outbus: 0, fadeTime: 25);
2.wait;
~a = {SinOsc.ar([399, 400], 5,
LFPulse.kr(6) * 0.2)
*
EnvGen.kr(
Env.perc.circle, 1, 1, 0, 0.89);
}.play(outbus: 1, fadeTime: 25);
~b = {SinOsc.ar([439, 440], mul:
LFNoise0.kr([6, 6]).max(0) * 0.1)}.play(outbus: 2, fadeTime: 25);
~c = {SinOsc.ar([219, 220], 5,
LFPulse.kr(6) * 0.2)
*
EnvGen.kr(
Env.perc.circle, 1, 1, 0, 0.9);
}

```

```

}.play(outbus: 3, fadeTime: 25);
~d = {SinOsc.ar([530, 531], mul:
LFNoise0.kr([6, 6]).max(0) * 0.09)}.play(outbus: 4, fadeTime: 25);
~e = {SinOsc.ar([293, 294], 5,
LFPulse.kr(6) * 0.02)
*
EnvGen.kr(
Env.perc.circle, 1, 1, 0, 0.9);
}.play(outbus: 5, fadeTime: 25);
~f = {SinOsc.ar([589, 590], mul:
LFNoise0.kr([6, 6]).max(0) * 0.09)}.play(outbus: 6, fadeTime: 25);
~g = {SinOsc.ar([330, 329], 5,
LFPulse.kr(6) * 0.15)
*
EnvGen.kr(
Env.perc.circle, 1, 1, 0, 0.9);
}.play(outbus: 0, fadeTime: 25);
~h = {SinOsc.ar([657, 658], mul:
LFNoise0.kr([6, 6]).max(0) * 0.12)}.play(outbus: 7, fadeTime: 25);
6.wait;
e = {VarSaw.ar(100,0,
LFTri.kr(0.2,0,0.5,0.5),0.07) }.play(outbus: 1, fadeTime:25);
f = {arg gate=1;
var env, n=32;
env = Env
([0]++{1.0.rand.squared}.dup(n-1) ++ [0],
{rrand(0.005,0.2)}.dup(n),
\lin, n-8, 8 );
EnvGen.kr(env, gate, doneAction: 2) *
LFTri.ar(220,0,0.17)
}.play(outbus: 1, fadeTime: 25);
h = {SinOsc.ar(
freq: [792.86, 891.97],
mul: SinOsc.kr([0.6, 1], mul: 0.03).abs
)}.play(outbus: 2, fadeTime: 19);
i = {SinOsc.ar(
freq: [1071.06, 1189.29],
mul: SinOsc.kr([0.6, 1], mul: 0.03).abs
)}.play(outbus: 3, fadeTime: 19);
j = {SinOsc.ar(
freq: [1337.95, 1337.95],
mul: SinOsc.kr([0.6, 1], mul: 0.02).abs
)}.play(outbus: 4, fadeTime: 19);
k = {SinOsc.ar(
freq:[399.86, 439.97],
mul: SinOsc.kr(
[0.5, 0.5], mul: 0.02).abs
)}.play(outbus: 5, fadeTime: 20);
l = {SinOsc.ar(
freq:[589.06, 530.29],
mul: SinOsc.kr(
[0.5, 0.5], mul: 0.02).abs
)}.play(outbus: 6, fadeTime: 20);
m = {SinOsc.ar(
freq:[657.95],
mul: SinOsc.kr(
[0.5, 0.5], mul: 0.03).abs
)}.play(outbus: 7, fadeTime: 20);
20.wait;
n = {LFPulse.ar(49,0,
LFTri.kr(0.6,0,0.5,0.5),0.18) }.play(outbus:6, fadeTime: 25);
o = {LFPulse.ar(35,0,
LFTri.kr(0.6,0,0.5,0.5),0.18) }.play(outbus:3, fadeTime:25);
p = {SinOsc.ar(399.86.dup, mul:
SinOsc.kr((0.6).abs, mul: 0.25) *
EnvGen.kr(

```

```

Env.triangle.circle,
1, 1, 0, 0.6)).play(outbus: 0, fadeTime: 45);
q= {SinOsc.ar(439.97.dup,
mul: SinOsc.kr((0.2).abs, mul: 0.3) *
EnvGen.kr(
Env.triangle.circle, 1, 1, 0, 0.6))}.play(outbus: 1, fadeTime: 45);
r= {SinOsc.ar(530.29.dup, mul:
SinOsc.kr((0.6).abs, mul: 0.2) *
EnvGen.kr(
Env.triangle.circle, 1, 1, 0, 0.6))}.play(outbus: 2, fadeTime: 45);
t= {SinOsc.ar(589.06.dup, mul:
SinOsc.kr((0.6).abs, mul: 0.1) *
EnvGen.kr(
Env.triangle.circle, 1, 1, 0, 0.6))}.play(outbus: 3, fadeTime: 45);
u= {SinOsc.ar(657.95.dup, mul:
SinOsc.kr((0.6).abs, mul: 0.1) *
EnvGen.kr(
Env.triangle.circle, 1, 1, 0, 0.6))}.play(outbus: 4, fadeTime: 45);
v= {SinOsc.ar(100.dup, mul:
SinOsc.kr((0.6).abs, mul: 0.04) *
EnvGen.kr(
Env.triangle.circle, 1, 1, 0, 0.6))}.play(outbus: 6, fadeTime: 25);
w= {SinOsc.ar([792.86, 792.86], mul:
LFNoise0.kr([6, 6]).max(0) * 0.2)}.play(outbus: 1, fadeTime: 25);
x= {SinOsc.ar([891.97, 891.97], mul:
LFNoise0.kr([5, 5]).max(0) * 0.1)}.play(outbus: 2, fadeTime: 25);
y= {SinOsc.ar([1071.06, 1071.06], mul:
LFNoise0.kr([6, 6]).max(0) * 0.1)}.play(outbus: 3, fadeTime: 25);
z= {SinOsc.ar([1189.29, 1189.29], mul:
LFNoise0.kr([6, 6]).max(0) * 0.09)}.play(outbus: 4, fadeTime: 25);
~i= {SinOsc.ar([1337.95, 1337.95], mul:
LFNoise0.kr([5, 5]).max(0) * 0.1)}.play(outbus: 5, fadeTime: 25);
20.wait;
// synchronized triggers
d= { var synch = 5;
SinOsc.ar(196, mul:
EnvGen.kr(
Env.perc(0, 1),
Impulse.kr(4/synch))) +
SinOsc.ar(399, mul:
EnvGen.kr(
Env.perc(0, 1),
Impulse.kr(8/synch))) +
SinOsc.ar(5530, mul:
EnvGen.kr(
Env.perc(0, 1),
Impulse.kr(4/synch))) +
SinOsc.ar(657, mul:
EnvGen.kr(
Env.perc(0, 1),
Impulse.kr(2/synch))) +
SinOsc.ar(891, mul:
EnvGen.kr(
Env.perc(0, 1),
Impulse.kr(8/synch))) +
SinOsc.ar(1071, mul:
EnvGen.kr(
Env.perc(0, 1),
Impulse.kr(6/synch))) +
SinOsc.ar(1337, mul:
EnvGen.kr(
Env.perc(0, 1),
Impulse.kr(1/synch)))
* 0.15}.play(fadeTime:25);
45.wait;
a.release(7);

```

```

b.release(7);
c.release(7);
d.release(7);
e.release(7);
f.release(7);
g.release(7);
h.release(8);
i.release(8);
j.release(8);
k.release(8);
l.release(8);
m.release(8);
n.release(9);
o.release(9);
p.release(9);
q.release(9);
r.release(9);
t.release(9);
u.release(10);
v.release(10);
w.release(10);
x.release(10);
y.release(10);
z.release(10);
~a.release(10);
~b.release(10);
~c.release(10);
~d.release(9);
~e.release(9);
~f.release(9);
~g.release(9);
~h.release(9.3);
~i.release(9.5);
}).play; )

```

4. V&A 7 (March 2013)

// Female (Jue Scale), Tonify (amplify) the Liver and Gall Bladder meridians to spread Liver *Qi*, Boost Zong *Qi*. Calm the Shen.

```

(
Routine({
1.wait;
~a= {SinOsc.ar([XLine.kr(25, 53, 25), 53].midicps, mul:0.03)}.play(outbus:
5, fadeTime: 10) ;
b= {SinOsc.ar([350.33, 350.33],
mul: LFNoise0.kr([2, 2]).max(0) * 0.05)}.play(outbus: 0, fadeTime:8);
//Jiao as fundamental
c= {SinOsc.ar([422.84, 422.84],
mul: LFNoise0.kr([1, 1]).max(0) * 0.05)}.play(outbus: 2, fadeTime:9);
d= {SinOsc.ar([473.30, 473.30],
mul: LFNoise0.kr([2, 2]).max(0) * 0.05)}.play(outbus: 4, fadeTime:10);
e={SinOsc.ar([525.49, 525.49],
mul: LFNoise0.kr([1, 1]).max(0) * 0.05)}.play(outbus: 6, fadeTime:11);
f= {SinOsc.ar([631.29, 631.29],
mul: LFNoise0.kr([2, 2]).max(0) * 0.05)}.play(outbus: 1, fadeTime:12);
g = {SinOsc.ar(
freq: [704.79, 846.79],
mul: SinOsc.kr([0.6, 1], mul: 0.02).abs)}.play(outbus: 3, fadeTime:15);
10.wait;
h = {SinOsc.ar(
freq: [952.09, 1128.95],

```



```

mul: SinOsc.kr([0.6, 1], mul: 0.04).abs)}.play(outbus: 6, fadeTime:16);
i= {SinOsc.ar(
freq: [1270.01, 1270.01],
mul: SinOsc.kr([0.6, 1], mul: 0.05).abs)}.play(outbus: 7, fadeTime:17);

8.wait;
j = {SinOsc.ar(
SinOsc.kr(1.1).linexp(-1, 1, 50, 100).dup, mul: 0.018)}.play(outbus: 1, fadeTime:
10);
k = {SinOsc.ar([
SinOsc.kr(1.1).linlin(-1, 1, 50, 98),
SinOsc.kr(1.1).linexp(-1, 1, 110, 210)], mul: 0.018)}.play(outbus: 5, fadeTime:
10);
l= {SinOsc.ar([
SinOsc.kr(1.1).linlin(-1, 1, 50, 95),
SinOsc.kr(1.1).linexp(-1, 1, 110, 210)], mul: 0.018)}.play(outbus: 3,
fadeTime:10);
m= {SinOsc.ar(350.33.dup,
mul: SinOsc.kr((0.6).abs, mul: 0.05) *
EnvGen.kr(Env.perc.circle, 1, 2, 0, 0.9))}.play(outbus: 0, fadeTime:21);
n= {SinOsc.ar(422.84.dup,
mul: SinOsc.kr((0.67).abs, mul: 0.05) *
EnvGen.kr(Env.perc.circle, 1, 2, 0, 0.9))}.play(outbus: 2, fadeTime:22);
o= {SinOsc.ar(473.30.dup,
mul: SinOsc.kr((0.6).abs, mul: 0.05) *
EnvGen.kr(Env.perc.circle, 1, 2, 0, 0.9))}.play(outbus: 4, fadeTime:23);
p= {SinOsc.ar(525.49.dup,
mul: SinOsc.kr((0.6).abs, mul: 0.05) *
EnvGen.kr(Env.perc.circle, 1, 2, 0, 0.9))}.play(outbus: 6, fadeTime:24);
q= {SinOsc.ar(631.29.dup,
mul: SinOsc.kr((0.6).abs, mul: 0.05) *
EnvGen.kr(Env.perc.circle, 1, 2, 0, 0.9))}.play(outbus: 1, fadeTime:25);
r= {SinOsc.ar(60.dup,
mul: SinOsc.kr((0.6).abs, mul: 0.009) *
EnvGen.kr(Env.perc.circle, 1, 2, 0, 0.9))}.play(outbus: 5, fadeTime:26);
8.wait;
t= {arg gate=1;
var env, n=32;
env =Env
([0]++{1.0.rand.squared}.dup(n-1) ++ [0],
{rrand(0.005,0.2)}).
dup(n),
\lin, n-8, 8);
EnvGen.kr(env, gate, doneAction: 2) *
LFTRI.ar(350.33, 0, 0.09)}.play(outbus: 3, fadeTime:25);
5.wait;
a=
~myRoutine =
Routine({
70.do({0.62.wait;
{EnvGen.kr(Env.perc(1, 0.005, 1, 4), doneAction:2) *
SinOsc.ar(422.84, 0, 0.09)}.play;
0.62.wait;
{EnvGen.kr(Env.perc(1,0.005,1,4), doneAction:2) *
SinOsc.ar(422.84,0,0.09)}.play;
0.62.wait;
{EnvGen.kr(Env.perc(1,0.005,1,4), doneAction:2) *
SinOsc.ar(422.84,0,0.09)}.play;
});
}).play;
15.wait;
u= {SinOsc.ar([XLine.kr(25, 53, 25), 53].midicps, mul:0.039)}.play(outbus:
6);
6.wait;
v= {SinOsc.ar(350.33.dup,
mul: SinOsc.kr((0.6).abs, mul: 0.03) *

```

```

EnvGen.kr(Env.triangle.circle, 1, 1, 0, 0.9)).play(outbus: 0, fadeTime:23);
w= {SinOsc.ar(422.84.dup,
mul: SinOsc.kr((0.67).abs, mul: 0.03) *
EnvGen.kr(Env.triangle.circle, 1, 1, 0, 0.9)).play(outbus: 2, fadeTime:24);
x= {SinOsc.ar(473.30.dup,
mul: SinOsc.kr((0.6).abs, mul: 0.03) *
EnvGen.kr(Env.triangle.circle, 1, 1, 0, 0.9)).play(outbus: 4, fadeTime:25);
y= {SinOsc.ar(525.49.dup,
mul: SinOsc.kr((0.6).abs, mul: 0.03) *
EnvGen.kr(Env.triangle.circle, 1, 1, 0, 0.9)).play(outbus: 6, fadeTime:26);
z= {SinOsc.ar(631.29.dup,
mul: SinOsc.kr((0.6).abs, mul: 0.05) *
EnvGen.kr(Env.triangle.circle, 1, 1, 0, 0.9)).play(outbus: 1, fadeTime:26);
~z= {SinOsc.ar(88.dup,
mul: SinOsc.kr((0.6).abs, mul: 0.009) *
EnvGen.kr(Env.triangle.circle, 1, 1, 0, 0.9)).play(outbus: 2, fadeTime:26);
10.wait;
~b= {SinOsc.ar([350.33, 350.33], mul:
LFNoise0.kr([2, 2]).max(0) * 0.16)}.play(outbus: 0, fadeTime:8);
//Jue as fundamental
~c= {SinOsc.ar([422.84, 422.84], mul:
LFNoise0.kr([1, 1]).max(0) * 0.09)}.play(outbus: 4, fadeTime:9);
~d= {SinOsc.ar([473.30, 473.30], mul:
LFNoise0.kr([2, 2]).max(0) * 0.09)}.play(outbus: 6, fadeTime:10);
~e={SinOsc.ar([525.49, 525.49], mul:
LFNoise0.kr([1, 1]).max(0) * 0.09)}.play(outbus: 1, fadeTime:11);
~f= {SinOsc.ar([631.29, 631.29], mul:
LFNoise0.kr([2, 2]).max(0) * 0.09)}.play(outbus: 2, fadeTime:12);
20.wait;
a.stop;
~a.release(28);
b.release(28);
c.release(28);
d.release(28);
e.release(28);
f.release(28);
g.release(25);
h.release(25);
i.release(25);
10.wait;

j.release(3);
k.release(5);
l.release(7);
m.release(8);
n.release(9);
o.release(10);
p.release(10);
q.release(11);
r.release(11);
t.release(3);
u.release(3);
v.release(11);
w.release(11);
x.release(11);
y.release(11);
z.release(11);
~z.release(10);
~b.release(10);
~c.release(10);
~d.release(10);
~e.release(10);
~f.release(10);
}).play;)

```

5. V&A 1 (April 2013)

// Female 70 (Zhi pulse). Intermittent and Irregular. Tonify (amplify) Heart and Pericardium meridians. Smooth Liver *Qi* and descend (reduce) *yang* fire.

```
(
Routine
({
1.wait;
a= {LFPulse.ar(99,0,
LFTri.kr(0.6,0,0.7,0.5),0.055)}.play(outbus:7, fadeTime: 8);
b= {LFPulse.ar(98,0,
LFTri.kr(0.6,0,0.5,0.5),0.055)}.play(outbus:3, fadeTime: 8);
c= {SinOsc.ar([399.86, 399.86],
mul: LFNoise0.kr([2, 2]).max(0) *
0.07)}.play(outbus: 0, fadeTime: 18);
d= {SinOsc.ar([439.97, 439.97],
mul: LFNoise0.kr([4, 4]).max(0) *
0.07)}.play(outbus: 1, fadeTime: 18);
e= {SinOsc.ar([530.29, 530.29],
mul: LFNoise0.kr([4, 4]).max(0) *
0.07)}.play(outbus: 2, fadeTime: 18);
f= {SinOsc.ar([589.06, 589.06],
mul: LFNoise0.kr([3, 3]).max(0) *
0.07)}.play(outbus: 3, fadeTime: 18);
g= {SinOsc.ar([657.95, 657.95],
mul: LFNoise0.kr([2, 2]).max(0) *
0.06)}.play(outbus: 4, fadeTime: 18);
5.wait;
h= {var ctl =
HPF.kr(LFSaw.kr(0.3),
SinOsc.kr(XLine.kr(0.03), 60, 20, 22)) ;
SinOsc.ar(ctl * 116 + 130.81, mul: 0.09);
}.play(outbus:6, fadeTime: 5);
i= {var ctl =
HPF.kr(LFSaw.kr(0.3),
SinOsc.kr(XLine.kr(0.03), 60, 20, 22)) ;
SinOsc.ar(ctl * 116 + 130.81, mul: 0.09);
}.play(outbus:3, fadeTime: 5);
5.wait;
j= {SinOsc.ar(657.95.dup,
mul: LFNoise2.kr(5, 4).max(0) *
0.04)}.play(outbus: 5, fadeTime: 5);
k= {XFade2.ar(
SinOsc.ar(399),
LFPulse.ar(0.6, 0.2, 0.03, 0.07),
LFTri.kr(0.1, -0.1, 0.1)}.play (outbus:0);
l= {XFade2.ar(
SinOsc.ar(530),
LFPulse.ar(0.6, 0.3, 0.03, 0.07),
LFTri.kr(0.1, -0.1, 0.1)}.play (outbus:2);
2.wait;
m= {SinOsc.ar(
freq:[399, 439],
mul: SinOsc.kr([0.5, 0.59], mul: 0.04).abs)}.play(outbus: 0, fadeTime: 3);
n= {SinOsc.ar(
freq:[530, 589],
mul: SinOsc.kr([0.5, 0.5], mul: 0.035).abs)}.play(outbus: 1, fadeTime: 3);
o= {XFade2.ar(
SinOsc.ar([260, 262.03]).midicps,
LFPulse.ar(1, 3, 0.3, 0.5),
LFTri.kr(3, -3, 0.02)}.play(outbus: 2, fadeTime: 3);
p= {XFade2.ar(
```

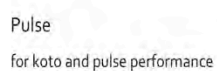
```

SinOsc.ar([264.06, 265.09]).midicps,
LFPulse.ar(1, 3, 0.3, 0.5),
LFTri.kr(3, -3), 0.02)}.play(outbus: 3, fadeTime:3);
    2.wait;
q= {SinOsc.ar(SinOsc.kr(1.65).linexp(-1, 1, 50, 98).dup, mul:
0.025)}.play(outbus: 7, fadeTime: 5);
r= {SinOsc.ar([SinOsc.kr(1.65).linlin(-1, 1, 50, 98),
SinOsc.kr(1.65).linexp(-1, 1, 110, 210)], mul: 0.015)}.play(outbus: 4, fadeTime:
5);
t= {SinOsc.ar([399, 398], 5, LFPulse.kr(7) * 0.19) *
EnvGen.kr(Env.perc.circle, 1, 1, 0, 0.59);
}.play(outbus: 5, fadeTime: 5);
u= {SinOsc.ar([439, 438], 5, LFPulse.kr(7) * 0.19) *
EnvGen.kr(Env.perc.circle, 1, 1, 0, 0.59);
}.play(outbus: 6, fadeTime: 5);
v= {SinOsc.ar([530, 531], 5, LFPulse.kr(7) * 0.09) *
EnvGen.kr(Env.perc.circle, 1, 1, 0, 0.59);
}.play(outbus: 7, fadeTime: 5);
w= {SinOsc.ar([589, 657], 5, LFPulse.kr(7) * 0.09) *
EnvGen.kr(Env.perc.circle, 1, 1, 0, 0.59);
}.play(outbus: 3, fadeTime: 5);
35.wait;
a.release(13);
b.release(13);
c.release(13);
d.release(13);
e.release(13);
f.release(13);
g.release(13);
h.release(13);
i.release(13);
j.release(13);
k.release(13);
l.release(13);
m.release(13);
n.release(13);
o.release(13);
p.release(13);
q.release(13);
r.release(13);
t.release(13);
u.release(13);
v.release(13);
w.release(13);
}).play;)

```

Appendix XII

Here is a selection of pages from Ryoko Akama's score for PULSE. This score uses the expressive marks and line drawing/painting of my pulse notations that I have made of Sumie Kent's (the Koto player) pulse (see Appendix IX, page 303).



Pulse
for koto and pulse performance

13 stringed koto: Sumie Kent
pulse performance: Michelle Lewis-King
technical support: Ashley Green

Ryoko Akama 2013

Figure 1: Title Page for 'PULSE' (2013) [score], a collaborative project with Ryoko Akama, Sumie Kent and Michelle Lewis-King, with technical support from Ashley Green. © Ryoko Akama. Image: Courtesy of the artist.

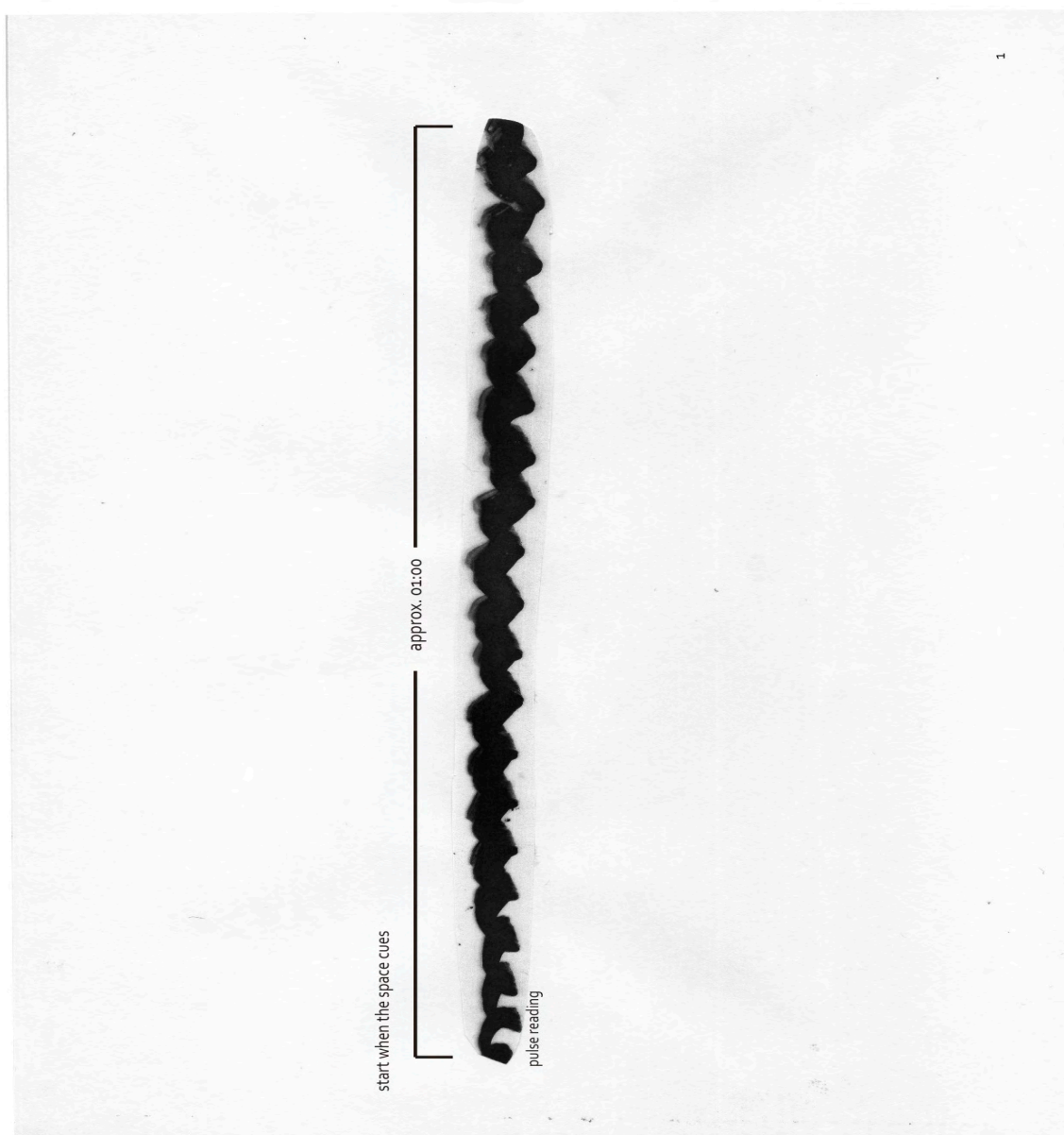


Figure 2: First Page for 'PULSE' (2013) [score], a collaborative project with Ryoko Akama, Sumie Kent and Michelle Lewis-King, with technical support from Ashley Green. © Ryoko Akama. Image: Courtesy of the artist.

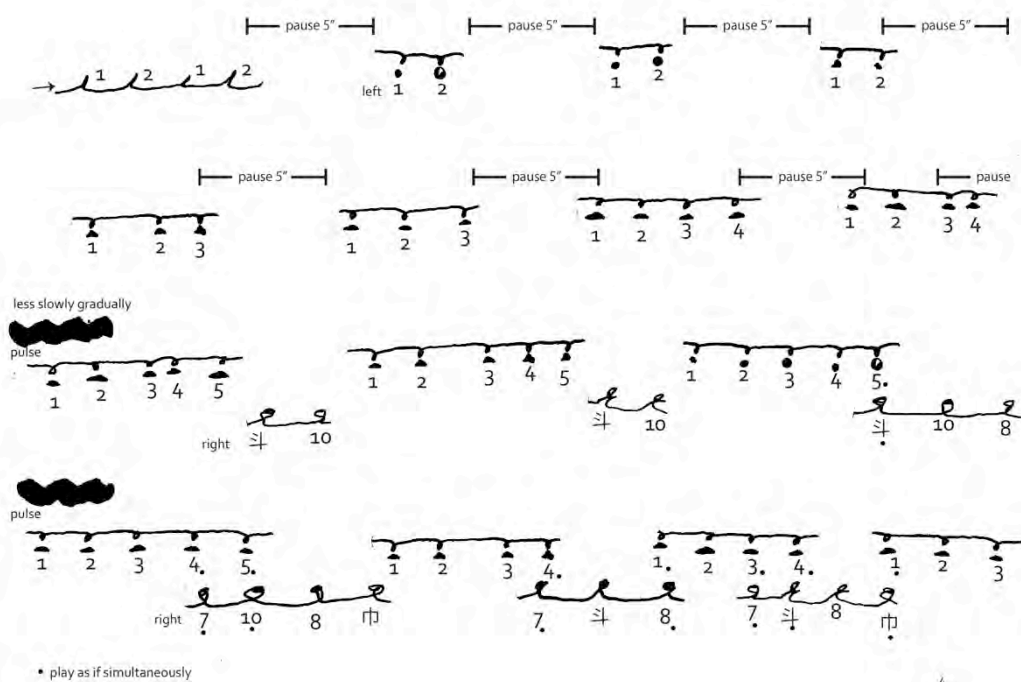


Figure 5: Fourth Page for 'PULSE' (2013) [score], a collaborative project with Ryoko Akama, Sumie Kent and Michelle Lewis-King, with technical support from Ashley Green. © Ryoko Akama. Image: Courtesy of the artist.

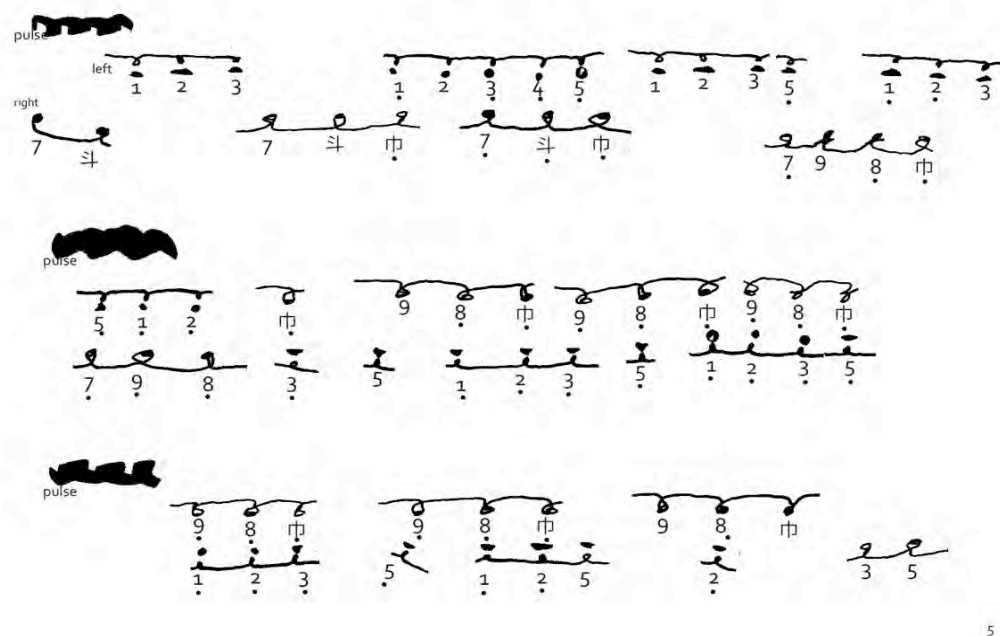


Figure 6: Fifth Page for 'PULSE' (2013) [score], a collaborative project with Ryoko Akama, Sumie Kent and Michelle Lewis-King, with technical support from Ashley Green. © Ryoko Akama. Image: Courtesy of the artist.

• play as if simultaneously

hear the decay of sound

3-5 3-5

3-5 3-5

max. down

pulse

fade out in order

6

The image displays a musical score for a piece titled 'PULSE' (2013). The score is written on a light blue background with black ink. It features several staves of music, each beginning with a 'pulse' symbol (a black cloud-like shape) and a horizontal line. The notation includes various musical symbols such as notes, rests, and dynamic markings. Key elements include:

- A top staff with a 'pulse' symbol and a horizontal line, followed by a series of notes and rests.
- A middle staff with a 'pulse' symbol and a horizontal line, followed by a series of notes and rests.
- A bottom staff with a 'pulse' symbol and a horizontal line, followed by a series of notes and rests.
- Annotations such as 'hear the decay of sound', '3-5 3-5', 'max. down', and 'fade out in order' are placed around the staves.
- The number '6' is located at the bottom right of the page.

Figure 7: Final Page for 'PULSE' (2013) [score], a collaborative project with Ryoko Akama, Sumie Kent and Michelle Lewis-King, with technical support from Ashley Green. © Ryoko Akama. Image: Courtesy of the artist.

Appendix XIII

Details of email correspondences for collaborative projects:⁴⁴³

As I discuss the collaborative projects that have been produced as an outcome of *Pulse Project* performance research in Chapter Four, in this section, I provide an edited dossier of twenty-three email correspondences between myself and other co-producers of the two collaborative projects *Pulse Readings at Rock House* and *PULSE* respectively.

Emails:

Pulse Readings at Rock House

1. **From: Michelle Lewis-King**
Date: Sun, Mar 22, 2015 at 12:36 PM
Subject: Performances
To: sumie kent

Hi Sumie-san,

I have just been notified that we have been selected to perform in an upcoming show in London and Hastings Andy just thought I would let you know! Of course we would pick you up in London and take you with us to stay here in Hastings and then back to London again, etc...

Let me know what you think!!

2. **From: sumie kent**
Date: Mon, Mar 23, 2015 at 10:50 AM
Subject: Re: Performances
To: Michelle Lewis-King

Hi, Michelle-san,

Congratulations to you! I'm going to book Coach ticket for 8th.

About performance;

Am I going to play just myself? Or are you still having a plan to do with me as well?

If you know how much time I've got to play and what people expecting me to do, please let me know.

3. **From: Michelle Lewis-King**
Date: Sun, Mar 29, 2015 at 1:32 PM
Subject: Re: Performances
To: Sumie Kent

⁴⁴³ To protect the collaborators' rights to privacy and confidentiality, these emails have been edited to omit all information referring to personal identity and/or personal circumstances.

Hi Sumie-san,

There are several ways we can perform. I think the best way though, would be if I took a set of 5 pulses and you could interpret them into a 20-minute piece. We can project the pulse scores so you and the audience can see them. Before this happens though, you and I will work out a system for reading the pulse scores I make. Each line of the 12 organs I draw will be assigned to a string/tone of the Koto. We will also work out a system for the waves of the lines and how you might interpret these lines into the vibrations of each string. I will also stagger the lines so you can roughly decide when to play each note. I think it would be a good idea to talk about this on Skype - do you have Skype? This way, we can work it all out before you arrive.

Let me know when you have time and we will talk via Skype!

PULSE

1. **From: ryoko akama**
Sent: 10 September 2012 10:33
To: Lewis-king, Michelle (Student)
Subject: Re: So lovely to have met you - the papers that went missing

Hi michelle.

How are you? It was lovely to talk to you. do you skype I would like to know a bit more of how you get waves and pulses of body.

best wishes

2. **Michelle Lewis-King 9/14/12**
to ryoko, me

Hi Ryoko,

Just to clarify my drawing of the pulses before we begin our discussion on that... The drawing of people's pulses as 'graphic notation' or scores (from which I use to make compositions with in SuperCollider) is something I have developed over the years and is unique to me and is actually one of the main components of my PhD project.

Background to pulse notation:

From the point of view of a practicing professional audio/visual artist, I also trained in Chinese Medicine and biomedicine a couple of years after my MA in Fine Art at Chelsea College of Art (Chelsea is where I began to make sound works and was influenced by the graphic scores of Stockhausen, John Cage, Cornelius Cardew, Yoko Ono, Mieko Shiomi, etc., in addition to the 'Notes for the Large Glass' of Marcel Duchamp).

Learning pulse taking in Chinese Medicine involved years of studying written descriptions of pulse 'types' (from both modern textbooks and interpretations of ancient texts) and through heavily supervised clinical training where I learned to match the pulse 'types' with what can be felt at the radial artery (wrist). After one knows how to identify the pulses 'properly', they can then begin to use intuition in their practice which becomes an artform. This is why I say that my fingers are my 'instrument' as I have developed this ability to listen deeply to others over the years with them. The pulse 'types' in the texts were referred to as pulse 'images', but there was actually no official images or drawings of the pulse types/images. The development of drawing peoples' pulses as a graphic score was my own innovation as an artist as it helped me to understand the waveforms within people better.

Hope this makes things clearer!

3. ryoko akama 9/14/12

to Michelle, me

hi. michelle. super great interest. your invention is your instrument. i like it. google Koto. There are loads of video clips.

It is quite a thing to work with. widely used for varieties of projects but I find it hard to discover something, less melody contextual, music orientated pieces of works, just because koto is really adjustable tool and everyone uses for the melodic beauty within.

No. I am not interested in it. Anyway, I am not a proper composer. I call myself a sound artist in most of cases. so I work with art of sound.

All mentioned by you are great inventors in sound scenes. there are some works I would go electronics if we want. for me, the organic aspects of your work, visual impact of your pulse interpretation, all matched score making. and a oriental instrument to realise.

I think it is daft to use our pulses though, nor koto performer's pulse. We need something. research. pulses of someone who is the pivot of the score. I think hard in a next few days.

r. x

4. From: ryoko akama
Date: Mon, Sep 17, 2012 at 7:58 PM
Subject: Pulse score
To: Michelle Marie Lewis-King

Hi Michelle.

Just a quick note. I have been thinking how we could start up the project. let me tell you this : impersonal strategy in personal inscription

- I think what you do is really really personal. nothing can be more personal than that as you see/hear that person's pulse that contains many information internal or external. (especially there is also a fact that you are not allowed to tell that person what you find...) That is very interesting. musical in emotional sense. this is why i quite liked the idea of yourself to use supercollider though in different sense it has not really reached to your need so far. I have been thinking how this project can be a masterpiece of sounds, collaboration of three without much of attention towards melancholy.

and I discover one way. it can be a total research-like context. we just work with the koto player. no other outside argument.

for example can we do a piece like this -

- 1) you take pulses off her wrists
- 2) she plays a composition which she chooses
- 3) you take another set of pulse off her wrist
- 4) i make a score using figures of your drawing, your texts and her texts. also have in mind that composition she chose.
- 5) she plays our score in the concert

I am saying this as the pulses you receive might be different before and after she plays a composition she chooses? have you done things like this before? how music will differ the performers pulse or your vision to take pulses? that will be a quite discovery.

it will enforce three of our practice which is something. let me know your thoughts. I see the koto player on Wed. I tell her I had met you.

R

5. From: ryoko akama
To: Michelle Marie Lewis-King
Date: Wed, Sep 19, 2012 at 7:58 PM
Subject: Re: Pulse score

hi.

I met Sumie, koto player today. it was interesting as she has been keen on learning and processing the idea of 'pulses / waves' of nature. anyway she was more than interested and happy to collaborate.

the concert in March at the Uni of Huddersfield will receive a professor from Bangor university for a video piece, a professor from Huddersfield university for music concerts with 'objects' and our pieces. great, it will be. probably will attract quite a lot of audience.

when can you come? best in October, after 14th.

best

6. From: Michelle Marie Lewis-King

To: ryoko akama

Date: Wed, Sep 19, 2012 at 11:28 PM

Subject: Re: Pulse score

Hi Ryoko,

First let me say I am really excited to be working with you and Sumie. I think in these early stages it is good to ask questions and make things clear so no-one feels misunderstood or has misgivings.

Some clarifications:

On my pulse reading as 'personal' -

The drawings of the pulses are 'indicative' instead of merely 'representative' and my work is more based on a research approach to phenomena than on any form of sentimentality. I understand that pulse reading may seem personal, but really it is meta-physical and not about the person per se... What I 'find' in the pulse of others is what I have liberated from a purely diagnostic and clinical framework in order to reveal something about their 'being-in-time' as a phenomenal process, as an emanation - which is both simultaneously personal and collective. So, the readings are unique: both personal and impersonal.

It would be good to meet (or skype) and talk this through more to establish what the outcomes, i.e., how the score could be designed, what the role of each participant will be and how the performance will be realized.

Research Terrains-

I think it would be useful to slow down and work in a more exploratory way, discussing a little more the ideas we each have and what roles we envision mapping out for the project out. Perhaps we will do this when we meet or on talk next on skype?

Questions of Collaboration-

In what ways does your vision of our collaboration extend and develop my pulse project into something truly new?

What would you define as a 'collaboration'?

How does this project fit into your body of work?

Where and how will the boundaries between our research contributions be made clear for the audience and for our supervision (this of course would include Sumie)?

Hope this makes sense to you and please let me know your thoughts! Forward whatever you feel necessary to Sumie.

Excited about the church venue and line up in Huddersfield- will chase things this end.

7. From: ryoko akama

To: Michelle Marie Lewis-King

Date: Fri, Sep 21, 2012 at 11:02 AM

Subject: Re: Pulse score

Hi Michelle.

Thanks for your thoughts, Michelle. Firstly I am so pleased to hear your voice of deeper thoughts. Things are much more clearer on my side.

I have also forwarded your email to Sumie, who now is very keen on going ahead as a performer.

I like the way how you specify your role as a sound artist, not a musician. I always feel the same as you. Does not matter if I am writing a score, creating a collaborative workshops, making improvisational pieces, I definitely categorise my work settings as sound per se. Somehow they are not music though I still find it difficult to find a threshold between.

Re : What I 'find' in the pulse of others is what I have liberated from a purely diagnostic and clinical framework in order to reveal something about their 'being-in-time' as a phenomenal process. Yes. I now understand your research is more towards the embodiment of science, related to (maybe) their ontology, but the cross disciplinary field in deep sense, morphing into a unique shape by your practice.

I suppose 'personal' was not a right word for me to use as a starting point. What I felt in the conference, difference between most of all others and you, is the presence of humanity without total detachment from what we are, which I detect a lot from those mentioned past artists, including Cage, Feldman, Tudor, Toru Takemitsu etc... And I probably used the word 'personal' only because I inquired into your performance to find out 'can you actually find something about me?'. The answer you gave me was nothing more than the truth of my body, which was quite a surprise. Not because I do not normally believe the way humans can interact and understand by touching, but because I just had not expected to have such conversation at the technology conference.

So going back to the subject, personal and humanity. Yes there is a difference I can take in. A work can be very personal but cold and systematic (I struggle how to explain as I have no idea how to say the antonym of humanity in English!!). On the contrary, a work can be very impersonal but demonstrated with humanity.

I must be more careful with English idioms, antonyms and synonyms.

So let talk over your question -

In what ways does your vision of our collaboration extend and develop my pulse project into something truly new?

I think this is something I should not talk over alone. We can discuss over it together, or more likely you can develop your proposals. All I can see is how you have developed and roughly know your delicate drawings you had chosen to work with, which are superb.

I know that I would like to work with your drawings - but it is not as simple as this. we must see why we are here. what we are investigating on and where we want to take it to.

What would you define as a 'collaboration'?

Happening. A work without a dictator.

How does this project fit into your body of work?

It will give me a unique scheme. I would need to know if there is definition difference in pulse - vibration - aura - undulation if you can guess where I am struggling for better understandings.

I am interested in strings. see this extract from my last workshop report.

Continuous musical exploration in Shamisen lutes consequently made me intrigued by the theoretical concern for a string which is the main structure of acoustic in lutes. Strings in general provoke basic movements – snap, pluck, bend, stretch, bow, pull, push, squeeze, cut, knob, vibrate, shake, throw – all serve as sound manipulations. I investigated in characteristics and textures of a string entity in workshops, asking actively sonic participation.

My sonically exploration and interest in collaboration can be seen continuously.

We could take this piece in any direction. you could join in a performance. you could achieve what you want.

Where and how will the boundaries between our research contributions be made clear for the audience and for our supervision (this of course would include Sumie)?

This also has to be discussed with three. I think Sumie will contribute her thoughts in the near future too.

Lets Skype soon.

Email correspondence really limits my capacity to share my thoughts. and sometimes it creates misunderstandings. and Let me know if there is any good way of keeping all conversations between us for future use. I love to see how we can manage that.

best wishes

8. From: Sumie Kent

To: Michelle Lewis-King

Date: Mon, Sep 24, 2012 at 1:03 PM

Subject: Hi

Hi, Michelle,

I've heard about you from Ryoko and she forward your e-mail to me the other day. I play Koto and Shamisen as you know now and also a big fan of acupuncture.

I've been playing Koto music for just over 40 years and always hoped audiences to feel something from my playing.

What I'm saying is that vibration effect people to people despite whether we can feel or not. Every kind of sound, thoughts and noise, they are all vibrations as you know.

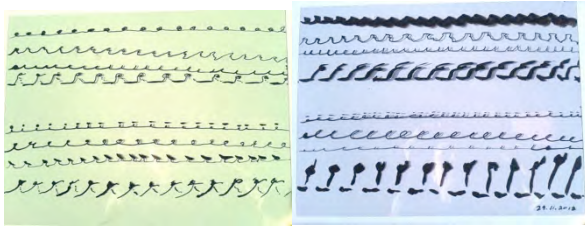
Sorry, I just wanted to say what's in my mind when I play because sound effect people directly. I can't use academical English words so please accept me. Hope three of us could talk together very soon.

9. ryoko akama 12/1/12

to sumie, me

Re: Pulse Readings.

forgive me. I had no time to get scanned. they are photos taken with my mobile. hope they helps for now... best



* These are my notations of the Koto player's pulse. See Appendix VII, page 303 for better images.

10. Michelle Lewis-King 12/1/12

to ryoko

Hi Ryoko,,

Thanks for the pics! They look great! I think I need to spend time working out a system of drawing though... Perhaps practice my brush-marks in a way that takes in Sumie's plucking/playing the Koto perhaps... Take your time with the scans.

M

11. ryoko akama 12/10/12

to me, sumie

Hi Michelle. (CC to Sumie san)

(Sumie san. I attached the email from Michelle below. You may have to read it before my email//)

Michelle, I will see Sumie-san on Thursday next week to discuss technical aspects of koto instrument. Before, I shall be thinking and thinking over how I will compose the score. (text / graphic / tablature / etc...)

In the meantime, I would love your input on those issues

- 1) Do you have access to a good contact mic and a mini camera for a calligraphy you do on the performance? If not, do you have budget to invest? (I have already used 250 pounds annual PhD budget for other things. and I have none till next September)
- 2) I will investigate with projector tech spec and sound patch. (either take amplified sound into a patch - mixer - speaker, or simply sound - mixer - speaker.)
- 3) I think I give up on the idea of having a white kimono and project the visual onto it and project against it.

I am thinking how to achieve visual in critically unconventional way, yet still make sense for why so.

- 4) I have suggested multi channel speaker system for the concert. We probably have four surrounding us. I want to something intimate and work with the space, avoiding the idea of 'audience' and 'performers'.

- 5) The concert day will change. There was an issue on choosing date and so on. It may come out as 19th/20th of April. Monty is trying to find a day when we are capable of using a concert hall here. Please let me know at this very moment, which date you would not be able to join in.

I will have a discussion with one of tech man at the uni. for practical realisation of the performance.
in the meantime, Michelle, let me hear meanings of pulses, or skype?

12. Michelle Marie Lewis-King 12/12/12

to ryoko, sumie

Ryoko:

Here are my notes from the pulse taking session.

This pulse reading will probably need some explanation so I will turn my skype on in the morning (I am 8hrs behind you). I should be ready by 10 my time, 6pm your time - but if it is better to talk after the children have gone to sleep, I will be available :) Let me know.

Ryoko & Sumie:

Pulse Notes:

Overall characteristics - 'Determined', 'Restrained' and 'Regular'

Qualities:

The sense of the pulse is one that has strong determination to meet with something in the world but is mediated by a sense of constraint (emotional -spiritual) from realising its full expression of 'selfhood'. The pulse arrives regularly with no irregularities and there are no hesitations. This is an 'upright' and morally dutiful person who possesses a deep passion and a drive to reach outwards and to create something of beauty/magic. The constraint manifests at the periphery/intersection where the person's 'will' goes beyond themselves towards others - at the edge of their being (this person has a great desire for communion with the outside/universe but they are restrained at the last moment by some mechanism from within themselves - this restraint goes back into the person's past as the pattern is 'deep' and far-reaching).

Specific Characteristics:

The pulse cadence is regular - about 5-6 beats per breath (this includes one circuit of a breath in and out). The pulse is fine/ refined (has a thin feeling in the vessel) and the deepest root of the pulse (where the pulse rises up from the depth of the body) is 'hidden'. This means the pulse is held below where it should normally exist and this gives the impression of a restraint that comes from a deep and far reaching place. The pulse rises up to the upper reaches of the wrist (which corresponds to the upper aspects of the body and spirit) and becomes strongly expressed there - this part of the pulse feels like something that has a lid on it but it wants to be free. The overall quality of the pulse to the touch is 'choppy' which means it has the ghostly/potential quality of a plucked bowstring - but the 'tense' effect of the bowstring is considerably softened and resembles instead a 'choppy' wave interval - this is because of the weakened state of blood and yin. The middle of the right pulse (the earth) is weaker than the one on the left.

Remedy:

The 'water' and 'earth' of this person - (our kidney and stomach systems) needs supporting (by getting proper sleep and nourishment) to enable the system to work more smoothly and for the person to have the strength to reach beyond the restraint they are encountering.

Let me know your thoughts.

13. Michelle Lewis-King 2/18/13

to Ryoko

Hi Ryoko,

I like the image of what you write about the piece being composed with lots of space/silence and sparse sounds - it resembles taking the pulse in that it seems to be producing sounds that enable 'listening' to sound, which is lovely! The only question I guess I have is how the is linked to Sumie's pulse being taken in terms of rhythmicity? Am I taking her pulse at some point in the performance which connects my writing/painting to the pulse or is it simply an expression of the pulse in the form of calligraphic painting that I am producing? I would prefer for there to be a connection as for me that is the primacy of the pulse - but can see that performance-wise, that is a challenge.

Let me know your thoughts. We can chat on Wednesday if you want (I am teaching tomorrow). Sounds good and starting to get excited!

I am still waiting for a reply from the ... director about the best way to attach the mic, but I am going to ask others in the science tech dept now...

'how is my performing the painting/writing linked to Sumie's pulse....' if I am not taking her pulse as part of the performance, how will the audience know that my pulse paintings are linked to her pulse? Mx

14. ryoko akama 2/18/13

to me

Hi.

Thanks for the long response.

I respond to the question that; by saying it is a feedback of pulse.

your pulse writing projected onto Sumie's kimono, who is playing my score, derived from Sumie's pulse taken by you, who is now drawing new pulse whilst she is playing who is creating sounds, that are integrated with writing noise you are making.

I foresee there is a huge challenge in that.

Hey, I somehow did not get your pulse attachment, though it seems that you sent it to gmail...

strange but I have this now. I will feedback on this as soon as!

best.

15. Michelle Lewis-King 2/27/13

to ryoko

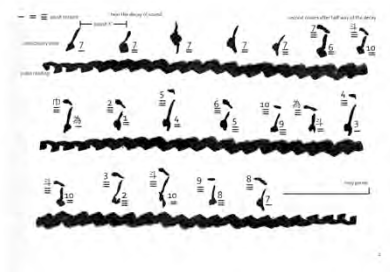
Hi Ryoko,

I really would like to discuss what we are doing in terms of the performance and we can work towards answering my earlier questions about how the audience will know that Sumie's pulse has been read and conceptualised towards artistic/sonic outputs by myself and where/how that fits into the performance vis-a-vis your score and my subsequent performing as a form of 'feedback'. If we talk soon, at least we will be clearer about what we have yet to do, etc., as I don't want you to have to do the lion's share of the work and things are getting busy for us all now! Let's talk as soon as we can. If Skype is a problem, just let me know and we can find another way to communicate. Hope to talk with you soon!

16. Ryoko Akama 3/7/13

to me

almost done. only refinement tonight. i am quite happy.... ryoko



* See Appendix X for Ryoko's score.

17. Michelle Lewis-King 3/7/13

to Ryoko

Looks fantastic!!!! I really love your score. I am excited about your score and how things are coming together. What did you think of what I sent you yesterday? Looking forward to talking soon. Mx

18. Sumie Kent 3/11/13

to me

Hi Michelle,

How are you doing?

Ryoko told me that you were extremely busy. I got musical score yesterday but I haven't played yet. I'm gonna extend my image into score tonight and I hope I can play tomorrow. Sumie

19. ryoko akama 3/11/13

to me, sumie

Hi Sumie and Michelle

Now the score is ready and tech spec is ready too I would like to suggest a schedule.

As this includes performance and technology, I really think we should have two rehearsal together.

1. after 7th April (Michelle, can you come one day? after your journal submission?) to try out performance. I suggest 8th or 15th or 16th April? I must book the concert hall and gears too...

2. 28th April (a day before the concert. it is Sunday. I think Michelle can come and stay at my house?) if we have 1, it is better as I must adjust if there is anything wrong with tech. I suggest we record on both days as well. 2 can be a few times trial, so that Monday can be chilled out and enjoy the day with food and etc.

Also I will go and get canvas and calligraphy papers. Michelle would you supply tracing papers or alternative for projection? Sumie is sawing the white kimono which is wonderful but we have to, really have to work on the direction of the projector.

Michelle let me know if you want to do pulse taking in atrium during the day. R

20. Ryoko Akama 4/27/13

to me, sumie

Hi Sumie san and Michelle

Tomorrow, I am looking forward to have you both here! I talked with Sumie san about how much pulse taking is of important role. Honestly it is holding the fundamental structure of the whole project. So please Sumie san talk with Michelle what we had talked about in Leeds. to remind you of my viewpoint:

1) the first 1 minute or two of pulse take, is so crucial as this should reflect sumie's pulses BEFORE the play of musical piece

2) Through the whole piece, the pulse take should be carefully achieved. How the lines are projected to show to the audience is vital.

so, lines of pulses (drawing), work of sounds (writing), needs to be as apparent as possible...

3) we have to see whether sumie's pulse will be changed as music goes on. It was the basic questioning. so Audience must be curious to find out the difference occurring to Sumie's pulses from the beginning to the end...

4) I will be in charge of the visual patch on the laptop so michelle can listen to sumie's koto and play with line drawings concentratedly.

5) Please play as carefully as possible. The whole process of pulses visually and audibly needs to be scanned as slowly as possible.

6) please Sumiesan explain what happens at the end. one by one. it goes away. the first pulse taking, then 斗、為、巾(11,12,13) strings, all slowly. one by one. one by one...

I rely on you Sumie san. I think we talked enough about the piece.

Michelle, it is your project. I know there are many to be previewed but it all will be blossomed on monday!

I hope to arrive before 17:00, set up all at once and rehearse once or twice with technology then off to home:

see you tomorrow. please call me. If I am available I can take it. if not leave a text please. R

III. Accompanying Material: Digital Audio Files

List of *Pulse Project* Soundscapes

The lists below correspond to the audio files submitted along with this thesis. This list provides details of the sonic works that have been produced throughout this project.

The audio works are divided into three sections:

I. *Pulse Landscapes* (2013)

This section represents a selection of SuperCollider pulse compositions originally produced as a digital EP 'Pulse Landscapes,' which was released by the experimental music label *Clang* in November 2013.⁴⁴⁴

Track list

1. Sam, Glasgow_1_25/05/2012 (0:38)
2. Michael, Glasgow_3_25/05/2012 (1:00)
3. David, Glasgow_7_25/05/2012 (1:03)
4. Bridget, Glasgow_64_25/05/2012 (1:03)
5. Nicholas, Leeds_1_07/09/2012 (1:25)
6. Richard, Leeds_3_07/09/2012 (1:46)
7. Ximena, Leeds_4_07/09/2012 (1:14)
8. Ryoko, Leeds_5_07/09/2012 (1:54)
9. Nick, Leeds_7_07/09/2012 (1:57)
10. Meredith, V & A_1_12/02/2103 (1:28)
11. Sandy, V & A_7_12/02/2013 (2:00)
12. Liz, Huddersfield_3_15/04/2013 (1:25)
13. Vivian, Reading_1_19/04/2013 (2:01)
14. Alex, Reading_7_19/04/2013 (1:59)
15. Virginia, Reading_9_19/04/2013 (1:44)

Total time: 22:37

II. *Pulse Project Soundscapes* (2015)

This set of tracks represent a selection of SuperCollider compositions produced between 2013-2015. The arrangement of tracks in this list are not chronological as each composition is arranged according to the 'generating' sequence of the *wǔxíng* cycle –

⁴⁴⁴ See <http://clang.cl/pulse-landscapes-2/> for details.

which is represented by the cyclic progression of the ‘five tones/pitches’ – from Earth (264Hz) to Fire (399)Hz (such as: *gōng> shāng> yǔ> jué> zhǐ*) – as in Appendix IX⁴⁴⁵

1. *Central Saint Martins 1* - May 2014 (1:37) - *Gōng*
2. *Hastings 2* - May 2015 (1:24) – *Shāng*
3. *Copenhagen 11* – December 2013 (1:37) – *Yǔ*
4. *Copenhagen 2* - November 2013 (1:24) – *Jué*
5. *Copenhagen 3* – December 2013 (1:40) – *Zhǐ*
6. *Anatomy Museum 2* – August 2014 (2:16) – *Zhǐ & Yǔ* (Ministerial Fire)
7. *Copenhagen 4* – January 2014 (1:39) - *Gōng*
8. *White Building 5* – December 2013 (1:08) – *Shāng*
9. *Copenhagen 1* – November 2013 (1:46) – *Yǔ*
10. *White Building 3* – December 2013 (1:05) – *Jué*
11. *Copenhagen 9* – January 2014 (1:22) – *Zhǐ*
12. *Anatomy Museum 5* – August 2014 (1:07) - *Zhǐ – Yǔ* (Ministerial Fire)
13. *White Building 4* - December 2013 (1:01) – *Gōng/Shāng*
14. *Anatomy Museum 7* - August 2014 (1:37) - *Yǔ*

Total Time: 21:23

III. *PULSE*

This track is a recording of the *PULSE* performance at Phipps Hall, University of Huddersfield, UK, April 29th, 2013 – with Ryoko Akama, Sumie Kent and Michelle Lewis-King.

1. *PULSE* - Total Time: 19:42

⁴⁴⁵ Refer to the diagram ‘Figure 5: *Five Elements: Cycles of Generation and Control* (2007)’ in Chapter Three for a demonstration of the ‘generative’ pattern of the *wǔxíng* cycle on page 60.